United States
Department of
Agriculture

Natural
Resources
Conservation
Service

In cooperation with the
South Dakota Agricultural
Experiment Station

Soil Survey of Clay County, South Dakota

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How To Use This Soil Survey

General Soil Map

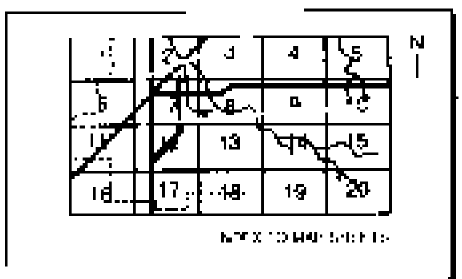
The general soil map, which is a color map, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

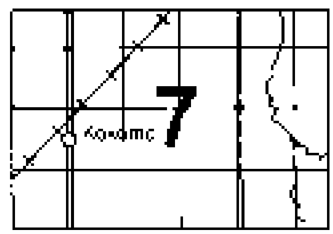
To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

Detailed Soil Maps

The detailed soil maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**. Note the number of the map sheet and turn to that sheet.

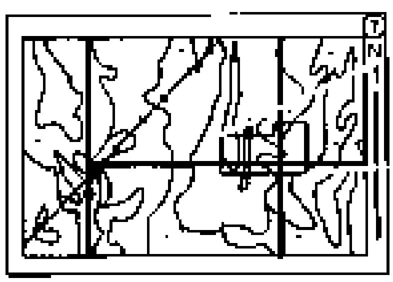




MAP SHEET

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described.

The **Contents** shows which table has data on a specific land use for each detailed soil map unit. Also see the **Contents** for sections of this publication that may address your specific needs.



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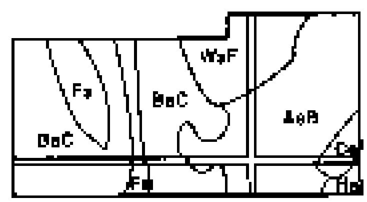

AREA OF INTEREST

NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1993. Soil names and descriptions were approved in 1993. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1993. This survey was made cooperatively by the Natural Resources Conservation Service and the South Dakota Agricultural Experiment Station. The survey is part of the technical assistance furnished to the Clay County Conservation District.

Cover: Spirit Mound, which is the highest point in the county, in an area of Ethan-Betts loams, 9 to 15 percent slopes. An area of Egan-Clarno-Trent complex, 1 to 6 percent slopes, is in the foreground.

Additional information about the Nation's natural resources is available on the Natural Resources Conservation Service homepage on the World Wide Web. The address is http://www.nrcs.usda.gov.

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Issued 2001

Foreword

This soil survey contains information that can be used in land-planning programs in Clay County, South Dakota. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations that affect various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are channeled or have been channelized. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the South Dakota Cooperative Extension Service.

Janet Oertly
State Conservationist
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Soil Survey of Clay County, South Dakota

By Kent E. Cooley, Natural Resources Conservation Service

Fieldwork by Kent E. Cooley and Daniel J. Brady, Natural Resources Conservation Service

United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with
the South Dakota Agricultural Experiment Station

CLAY COUNTY is in southeastern South Dakota (fig. 1). It has a total land area of 267,654 acres. In 1990, Clay County had a population of 13,186 (U.S. Department of Commerce, 1990). Vermillion is the county seat. Other communities include Burbank, Irene, Meckling, and Wakonda.

About 83 percent of the acreage in the county is cropland, about 9 percent is hayland, and about 3 percent is pasture and rangeland (U.S. Department of Commerce, 1992). Alfalfa, corn, and soybeans are the main crops. Farming is diversified. Cash crops are the main sources of income, but income from livestock and livestock products also is important.

This soil survey updates the survey of Clay County published in 1953 (Buntley and others, 1953). It provides additional information and has larger maps, which show the soils in greater detail.

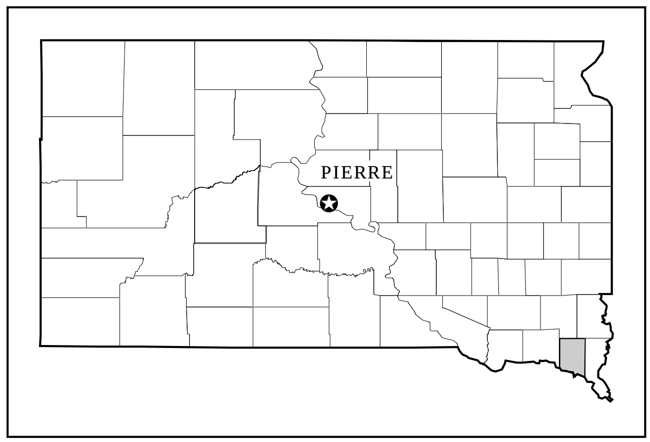

Figure 1.—Location of Clay County in South Dakota.

General Nature of the County

This section provides general information about Clay County. It describes climate; physiography, relief, and drainage; settlement; farming; and natural resources.

Climate

Table 1 gives data on temperature and precipitation for the survey area as recorded at Vermillion, South Dakota, in the period 1961 to 1990. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 21 degrees F and the average daily minimum temperature is 10 degrees. The lowest temperature on record, which occurred on February 11, 1988, is -33 degrees. In summer, the average temperature is 74 degrees and the average daily maximum temperature is 87 degrees. The highest recorded temperature, which occurred on July 4, 1990, is 108 degrees.

Growing degree days are shown in table 1. They are equivalent to “heat units.” During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is about 25 inches. Of this total, about 19 inches, or 76 percent, usually falls in April through September. The growing season for most crops falls within this period. The heaviest 1-day rainfall during the period of record was 3.71 inches on August 28, 1960. Thunderstorms occur on about 44 days each year.

The average seasonal snowfall is about 30 inches. The greatest snow depth at any one time during the period of record was 26 inches. On the average, 54 days of the year have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 81 percent. The sun shines about 75 percent of the time possible in summer and 57 percent in winter. The prevailing wind is from the south in the summer and from the northwest in the winter. Average windspeed is highest, 12 miles per hour, in spring.

Tornadoes and severe thunderstorms strike occasionally. These storms are local in extent and of short duration. They may result in sparse damage in narrow belts. Hailstorms occur at times during the warmer part of the year in irregular patterns and in relatively small areas.

Physiography, Relief, and Drainage

Clay County is made up of four physiographic subdivisions. These are the James River Lowland, James River Highland, and Coteau des Prairies divisions of the Central Lowlands physiographic province and the Missouri River Trench division of the Great Plains province. About one-third of Clay County is in the James River Highland, about one-third is in the Missouri River Trench, and about one-third is in the James River Lowland. The extreme northeast corner is on the Coteau des Prairies, a high land plateau (Flint, 1955).

The dissected uplands north of the Missouri River and west of the Vermillion River are part of the James River Highland. The relief in this part of the county ranges from nearly level to rolling. The nearly level and gently undulating areas are characterized by many small drainageways and depressions. In these areas, the drainage pattern is poorly defined where small drainageways terminate in the depressions and basins and is well defined along the larger drainageways. The steeper, more rolling areas are in the extreme northwest corner of the county.

The dissected uplands in the northeast corner of the county are part of the Coteau des Prairies. The relief in this area is nearly level to undulating. The drainage pattern is fairly well defined along the larger drainageways.

The Vermillion River flood plain and the relatively flat uplands adjacent to the flood plain are part of the James River Lowland. The relief is predominantly level to gently sloping. Steeper areas are along the well defined drainageways and bluffs adjacent to the flood plain.

The Missouri River flood plain is part of the Missouri River Trench (Christensen and Stephens, 1967a). The relief is predominantly level, but steeper areas occur along terrace escarpments and old abandoned channels. Drainage is a problem in some areas.

The principal drainageways and their tributaries in the western part of the county are Frog Creek and Spring Creek. They flow east to the Vermillion River. Ash Creek and Baptist Creek and their tributaries provide the principal drainage in the eastern part of the county. They flow west to the Vermillion River. Clay Creek Ditch, an artificial drainageway on the flood plain along the Missouri River, also flows in an easterly direction to the Vermillion River (Christensen and Stephens, 1967b).

Elevation ranges from about 1,130 feet above sea level in the southeastern part of the county, on the flood plain along the Missouri River, to about 1,500 feet in the northeast corner on the Coteau des Prairies.

Settlement

The departure of the Yankton tribe of the Dakota Indians for their new home on July 10, 1859, marks the official opening of the survey area to European settlement. The departure of the Yankton tribe was the result of a treaty ratified on February 17, 1859. The Dakota Territory was established in 1861, and Clay County was organized a year later. The county was named in honor of the prominent statesman, Henry Clay. The legislature named Vermillion the county seat in 1863 (Clay County Historical Society, 1976).

Settlement of Clay County was slow during the first decade because the United States was involved in the Civil War and Indian wars and uprisings were raging through the Dakota Territory. Upon completion of the Dakota Southern Railroad from Sioux City to Yankton in 1872, however, settlement of the area boomed. The railroad reached Vermillion on November 25. Construction of a main line through Union County to Centerville in 1883 and a branch line from Centerville to Yankton in 1885-86 brought benefits to residents in northern Clay County. The Homestead Act of 1862 also had a large impact on the settlement of the county (Clay County Historical Society, 1976).

The population of the county was only about 75 in

1860. By 1870, the population had risen to 2,818, according to the Federal census (Clay County Historical Society, 1976). In 1990, the population of the county was 13,186 and that of Vermillion, the largest town in the county, was 10,034 (U.S. Department of Commerce, 1990).

In the spring of 1881, major flooding of the Missouri River destroyed the greater part of the city of Vermillion, which was on the flood plain at that time. The present site of Vermillion was laid out high on the bluffs overlooking the Missouri River (Schell, 1985).

Railroads continue to serve the county, but the lines in the northern part of the county no longer exist. South Dakota Highways 19, 46, and 50 are the main highways. Most rural areas are served by all-weather roads, which carry traffic to centers of trade.

Farming

Farming is the principal enterprise in Clay County. About 73 percent of farm income is derived from the sale of corn, soybeans, alfalfa, and some small grain (U.S. Department of Commerce, 1992). The rest is derived mainly from the sale of livestock and livestock products. Some of the crops are used as feed for livestock.

In 1992, there were 437 farms in the county. The farms averaged about 541 acres in size (U.S. Department of Commerce, 1992). The trend is toward fewer and larger farms.

About 83 percent of the land in the county is used for cultivated crops and 9 percent for hay. Dryland farming is dominant; however, about 8,306 acres was irrigated in 1992 (U.S. Department of Commerce, 1992). All irrigation is by the sprinkler method. The main cropping system is a sequence of row crops and alfalfa. Corn and soybeans are the main cultivated crops. Alfalfa, intermediate wheatgrass, and smooth bromegrass are the main crops grown for hay. In 1992, corn was grown on 86,000 acres; soybeans on 94,000 acres; and oats on 2,500 acres (South Dakota Agricultural Statistics Service, 1993–94).

The Clay County Soil Conservation District was organized in 1940. The district has been instrumental in planting grass and trees and applying other conservation practices to help control erosion. The trees also provide protection for farmsteads and habitat for wildlife.

Natural Resources

Soil is the most important natural resource in the county. It provides a growing medium for crops and for the grass grazed by livestock. Other natural resources are water, sand and gravel, and wildlife.

The principal sources of water for domestic use and for livestock are bedrock aquifers and glacial-deposit aquifers (Christensen and Stephens, 1967b). Springs also are a source of water in some parts of the county. The quality of water from the bedrock aquifers is variable. It is poor in many places because of a high content of soluble salts. The glacial-deposit aquifers supply water of better quality than the bedrock aquifers. The glacial deposits are in the outwash valleys, sand and gravel lenses, and buried gravel. The feasibility of irrigation depends on the quality and quantity of available water and the suitability of the soil. In some areas, shallow wells provide water of good quality in sufficient volume for irrigation.

The principal surface-water resources are the Missouri and Vermillion Rivers and wetland areas. Dams and dugouts in drainageways and basins provide additional water for livestock and wildlife. Some of the intermittent drainageways are spring fed and provide water during much of the year. The Missouri River provides opportunities for swimming, fishing, boating, and waterfowl hunting. The Vermillion River provides canoeing, fishing, and waterfowl hunting opportunities. Intermittent lakes and sloughs also provide hunting and trapping opportunities.

Deposits of sand and gravel are extensive in Clay County. Sand and gravel are used mainly for road maintenance and construction.

Wildlife in the county includes whitetail deer and upland game birds, such as pheasant and Hungarian partridge. The many wetland areas provide habitat for waterfowl. Game fish, such as catfish, northern pike, sauger, walleye, and white bass, are in the rivers.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated parent material in which the soil formed. The unconsolidated parent material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil is associated with a particular kind of landform or with a segment of the landform. By observing the soils in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept or model of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

The descriptions, names, and delineations of the soils in this survey area do not fully agree with those in adjacent survey areas. Differences are the result of a better knowledge of soils, modifications in series concepts, or variations in the intensity of mapping or in the extent of the soils in the survey areas.

General Soil Map Units

The general soil map in this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. These broad areas are called associations. Each association on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils and some minor soils. It is named for the major soils. The components of one association can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

The soils in the associations are in different landform positions (fig. 2). These different landform positions affect such characteristics as the amount of topsoil, the drainage class, the runoff rate, and the content of organic matter.

A generalized overview of the relationship of soils to the parent material and to the position on the Missouri River flood plain is shown in figures 6 through 9.

Well Drained and Moderately Well Drained, Nearly Level to Steep, Loamy and Silty Soils on Till Plains and Moraines

These soils formed in glacial till and alluvium. They make up about 28 percent of the county. Areas are nearly level to steep. Most areas are used for cultivated crops. The steeper areas are used as pastureland, hayland, or rangeland. Controlling wind erosion and water erosion and conserving moisture are important management concerns if the major soils are cropped. Proper grazing management is an important concern in areas of pasture and rangeland.

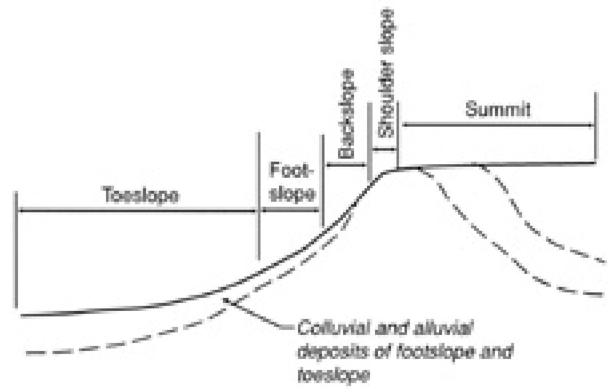

Figure 2.—Landform positions.

1. Ethan-Betts-Davis Association

Well drained, gently sloping to steep, loamy soils on till plains and moraines (fig. 3)

Composition

Percent of the survey area: 3

Extent of the components in the association:

Ethan and similar soils—35 percent

Betts and similar soils—20 percent

Davis and similar soils—20 percent

Minor soils—25 percent

Setting

Landform: Till plains, moraines, and colluvial fans or alluvial terraces

Position on the landform: Ethan—shoulder slopes and backslopes; Betts—upper shoulder slopes; Davis—footslopes

Slope range: Ethan—mainly 9 to 15 percent (15 to 40 percent in some areas); Betts—mainly 15 to 40 percent (9 to 15 percent in some areas); Davis—2 to 6 percent

Texture of the surface layer: Ethan—loam; Betts—loam; Davis—loam

Soil Properties and Qualities

Drainage class: Ethan—well drained; Betts—well drained; Davis—well drained

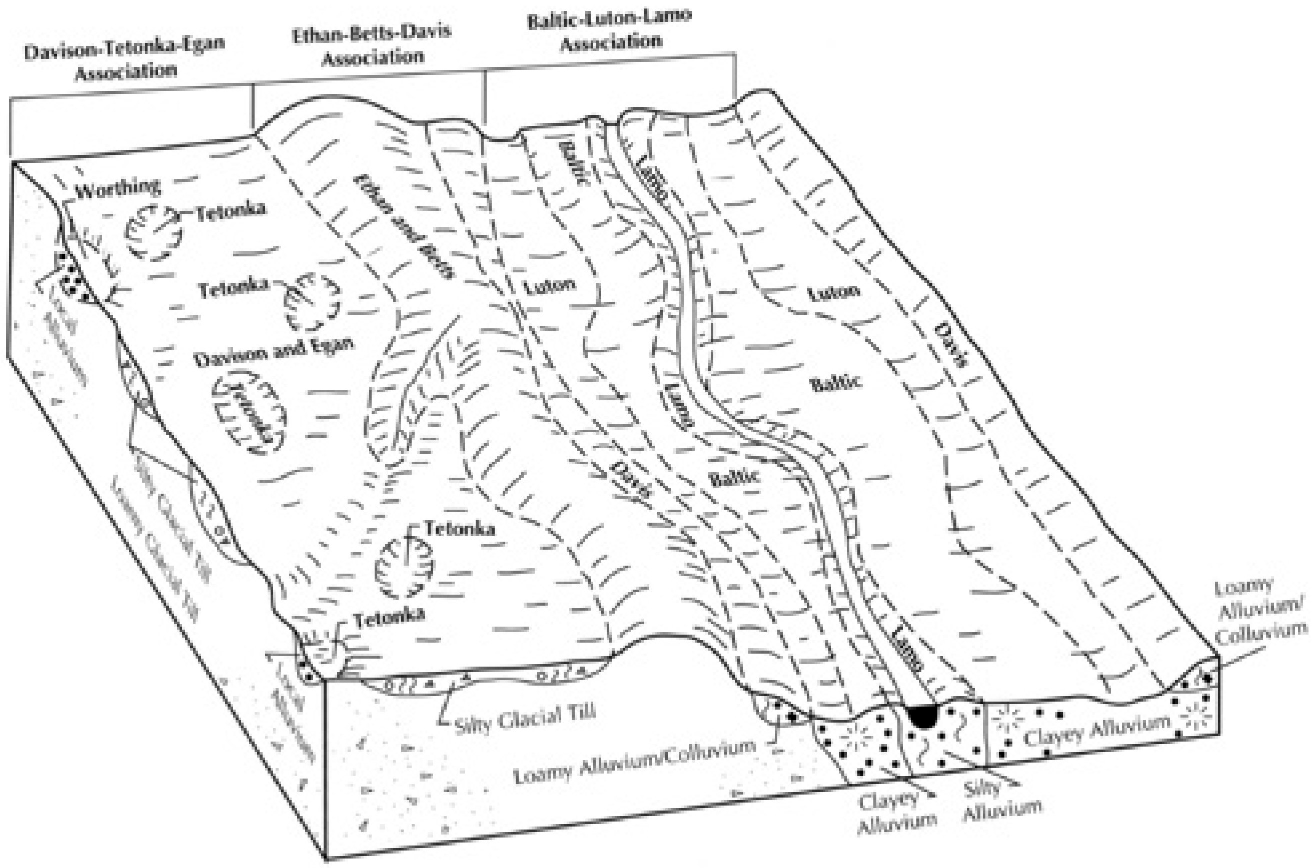

Figure 3.—Typical pattern of soils and underlying material in the Ethan-Betts-Davis, Davison-Tetonka-Egan, and Baltic-Luton-Lamo associations.

Depth to bedrock: Ethan—very deep; Betts—very deep; Davis—very deep

Depth to contrasting parent material: Ethan—more than 60 inches; Betts—more than 60 inches; Davis—more than 60 inches

Depth to the water table: Ethan—more than 6 feet; Betts—more than 6 feet; Davis—more than 6 feet

Flooding: None

Ponding: None

Permeability: Ethan—moderately slow; Betts—moderately slow; Davis—moderate

Available water capacity: Ethan—high; Betts—high; Davis—high

Content of organic matter: Ethan—moderately low; Betts—moderately low; Davis—high

Surface runoff: Ethan—high; Betts—high or very high; Davis—medium

Minor Soils

- The well drained Clarno soils in landform positions lower than those of the Ethan and Betts soils
- The excessively drained Talmo soils, which have gravelly material within a depth of 14 inches; in landform positions similar to those of the Ethan and Betts soils
- The well drained Egan soils on backslopes in the less sloping areas
- The somewhat poorly drained Chancellor soils on the lower toeslopes

Use and Management

Major use: About 85 percent of the association is used as pasture or hayland.

Other use: About 10 percent of the association is cropland.

Main crops: Generally unsuited to cultivated crops
Management concerns: Ethan and Betts—wind erosion, water erosion, and the high content of lime, which adversely affects the availability of plant nutrients; Davis—water erosion

2. Egan-Ethan-Trent Association

Well drained and moderately well drained, nearly level to undulating, silty and loamy soils on till plains (fig. 4)

Composition

Percent of the survey area: 25
Extent of the components in the association:
Egan and similar soils—35 percent
Ethan and similar soils—25 percent
Trent and similar soils—20 percent
Minor soils—20 percent

Setting

Landform: Till plains
Position on the landform: Egan—backslopes; Ethan—shoulder slopes; Trent—footslopes
Slope range: Egan—mainly 0 to 6 percent (6 to 9 percent in some areas); Ethan—mainly 2 to 6 percent (6 to 15 percent in some areas); Trent—0 to 2 percent
Texture of the surface layer: Egan—silty clay loam; Ethan—loam; Trent—silty clay loam

Soil Properties and Qualities

Drainage class: Egan—well drained; Ethan—well drained; Trent—moderately well drained
Depth to bedrock: Egan—very deep; Ethan—very deep; Trent—very deep
Depth to contrasting parent material: Egan—24 to 40 inches over loamy glacial till; Ethan—more than 60 inches; Trent—40 to more than 60 inches over loamy glacial till
Depth to the water table: Egan—more than 6 feet; Ethan—more than 6 feet; Trent—3.5 to 5.0 feet
Flooding: None
Ponding: None
Permeability: Egan—moderately slow; Ethan—moderately slow; Trent—moderate
Available water capacity: Egan—high; Ethan—high; Trent—high

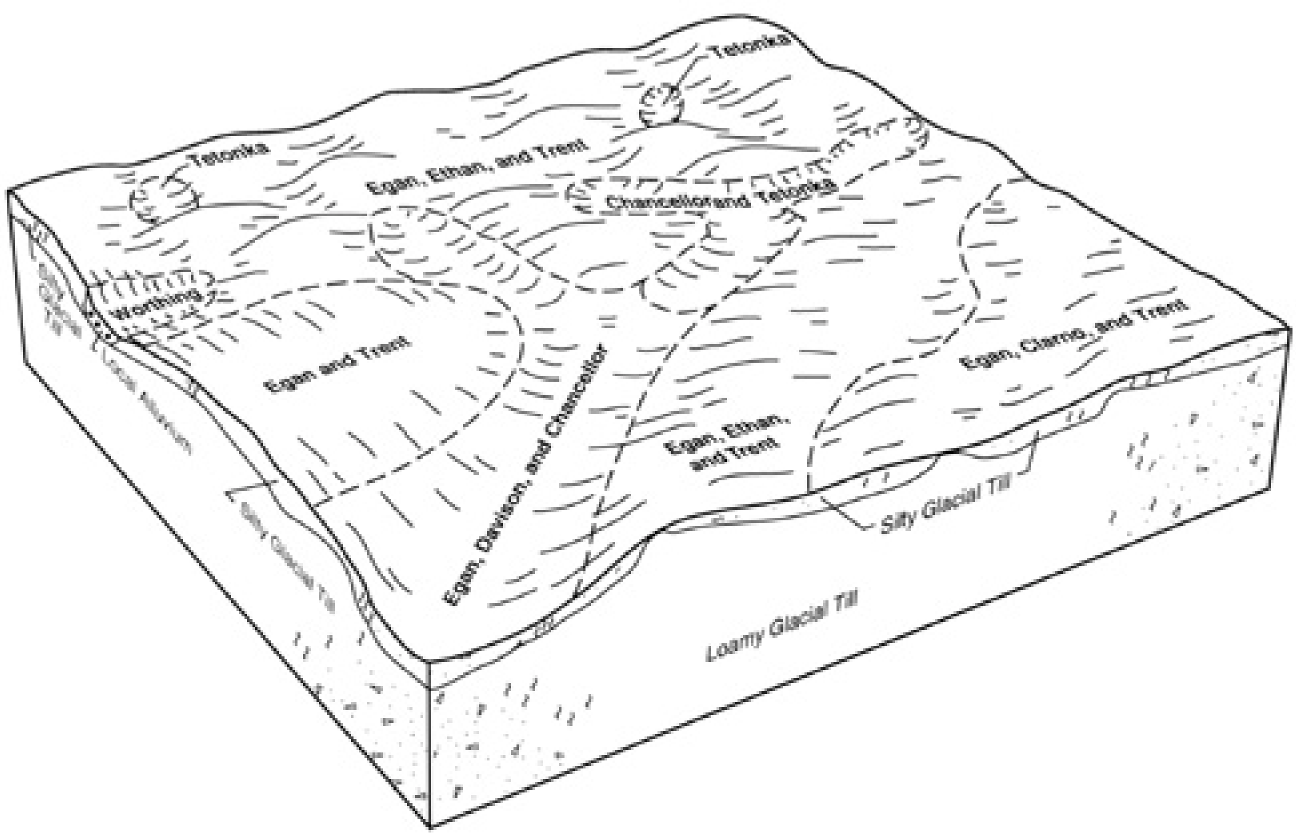

Figure 4.—Typical pattern of soils and underlying material in the Egan-Ethan-Trent association.

Content of organic matter: Egan—moderate; Ethan—moderately low; Trent—high
Surface runoff: Egan—medium; Ethan—medium; Trent—low

Minor Soils

- The somewhat poorly drained Chancellor soils on the lower toeslopes
- The poorly drained Tetonka soils in basins
- The well drained Clarno soils, which have more sand and less silt in the upper 24 to 40 inches than the Egan soils; in landform positions similar to those of the Egan soils
- The moderately well drained Davison soils on footslopes

Use and Management

Major use: About 90 percent of the association is cropland.
Other use: About 5 percent of the association is pasture or hayland.
Main crops: Alfalfa, corn, oats, and soybeans
Management concerns: Egan—water erosion; Ethan—wind erosion, water erosion, and the high content of lime, which adversely affects the availability of plant nutrients; Trent—excess moisture during wet years

Well Drained, Moderately Well Drained, Somewhat Poorly Drained, and Poorly Drained, Level to Gently Sloping, Loamy and Silty Soils on Till Plains

These soils formed in glacial till and alluvium. They make up about 31 percent of the county. Areas are nearly level and gently sloping, and many slopes terminate in basins. Nearly all of the areas are used for cultivated crops. Controlling wind erosion and water erosion and conserving moisture are important management concerns. Proper grazing management is an important concern in areas of pastureland.

3. Egan-Chancellor-Davison Association

Well drained, somewhat poorly drained, and moderately well drained, nearly level to gently undulating, silty and loamy soils on till plains (fig. 5)

Composition

Percent of the survey area: 15
Extent of the components in the association:
Egan and similar soils—35 percent
Chancellor and similar soils—20 percent
Davison and similar soils—20 percent
Minor soils—25 percent

Setting

Landform: Till plains
Position on the landform: Egan—backslopes; Chancellor—lower toeslopes; Davison—footslopes
Slope range: Egan—0 to 6 percent; Chancellor—0 to 2 percent; Davison—0 to 6 percent
Texture of the surface layer: Egan—silty clay loam; Chancellor—silty clay loam; Davison—loam

Soil Properties and Qualities

Drainage class: Egan—well drained; Chancellor—somewhat poorly drained; Davison—moderately well drained
Depth to bedrock: Egan—very deep; Chancellor—very deep; Davison—very deep
Depth to contrasting parent material: Egan—24 to 40 inches over loamy glacial till; Chancellor—40 to more than 60 inches over loamy glacial till; Davison—more than 60 inches
Depth to the water table: Egan—more than 6 feet; Chancellor—1 to 2 feet; Davison—2 to 4 feet
Flooding: Egan—none; Chancellor—frequent for brief periods; Davison—none
Ponding: None
Permeability: Egan—moderately slow; Chancellor—slow; Davison—moderately slow
Available water capacity: Egan—high; Chancellor—high; Davison—high
Content of organic matter: Egan—moderate; Chancellor—high; Davison—moderate
Surface runoff: Egan—low or medium; Chancellor—low; Davison—low or medium

Minor Soils

- The poorly drained Tetonka soils in basins
- The well drained Ethan soils, which have free carbonates at or near the surface; on shoulder slopes
- The well drained Clarno soils, which have more sand and less silt in the upper 24 to 40 inches than the Egan soils; in landform positions similar to those of the Egan soils
- The moderately well drained Trent soils on footslopes

Use and Management

Major use: About 95 percent of the association is cropland.
Other use: About 5 percent of the association is pasture or hayland.

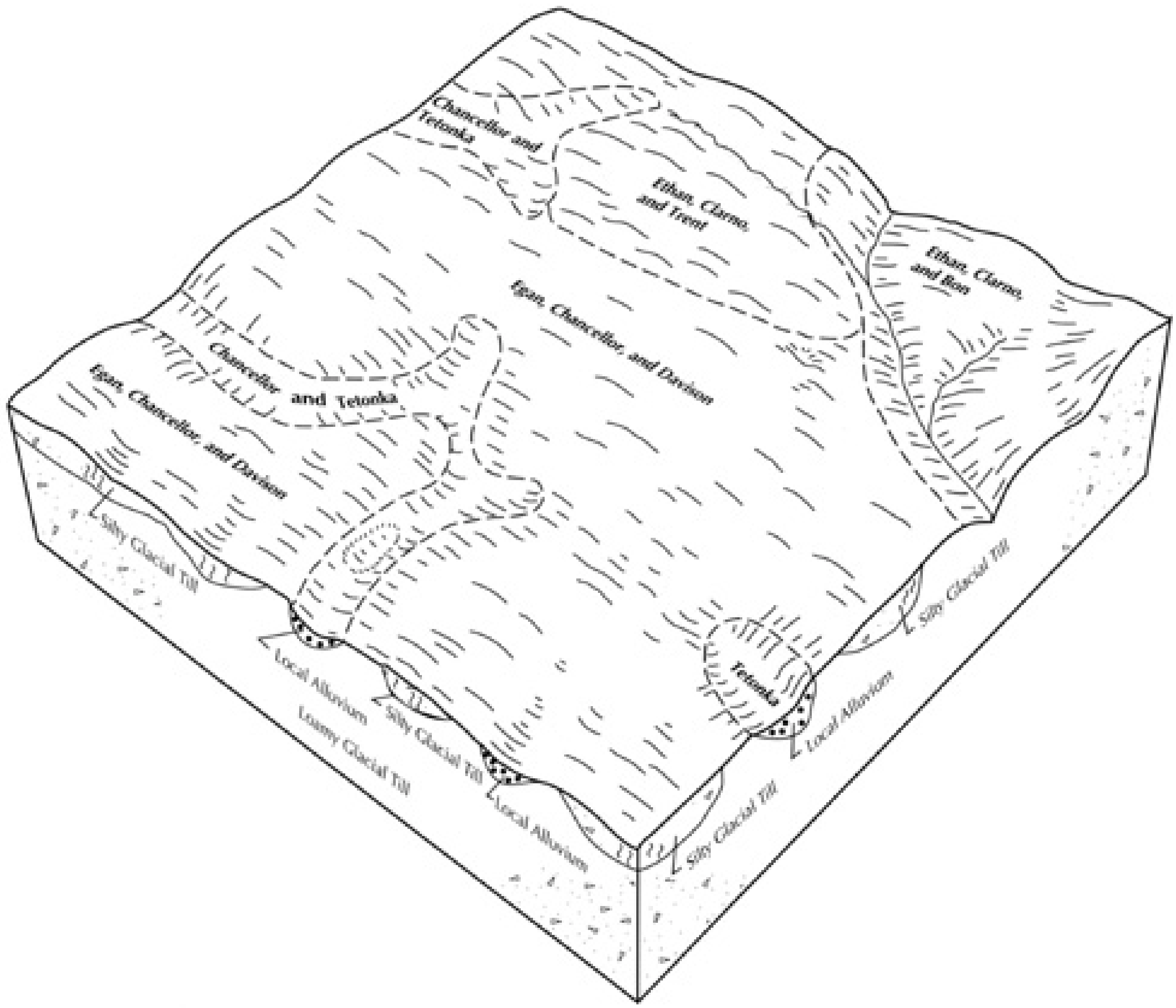

Figure 5.—Typical pattern of soils and underlying material in the Egan-Chancellor-Davison association.

Main crops: Alfalfa, corn, oats, and soybeans
Management concerns: Egan—water erosion on slopes of more than 2 percent; Chancellor—wetness; Davison—wind erosion and the high content of lime, which adversely affects the availability of plant nutrients

4. Egan-Ethan-Tetonka Association

Well drained and poorly drained, level to gently undulating, silty and loamy soils on till plains

Composition

Percent of the survey area: 3
Extent of the components in the association:
Egan and similar soils—35 percent
Ethan and similar soils—20 percent
Tetonka and similar soils—15 percent
Minor soils—30 percent

Setting

Landform: Till plains
Position on the landform: Egan—backslopes; Ethan—shoulder slopes; Tetonka—basins
Slope range: Egan—0 to 6 percent; Ethan—mainly 2 to 6 percent (6 to 15 percent in some areas); Tetonka—0 to 1 percent

Texture of the surface layer: Egan—silty clay loam; Ethan—loam; Tetonka—silt loam

Soil Properties and Qualities

Drainage class: Egan—well drained; Ethan—well drained; Tetonka—poorly drained
Depth to bedrock: Egan—very deep; Ethan—very deep; Tetonka—very deep
Depth to contrasting parent material: Egan—24 to 40 inches over loamy glacial till; Ethan—more than 60 inches; Tetonka—more than 60 inches
Water table: Egan—at a depth of more than 6 feet; Ethan—at a depth of more than 6 feet; Tetonka—1 foot above to 1 foot below the surface
Flooding: None
Ponding: Egan—none; Ethan—none; Tetonka—frequent for long periods
Permeability: Egan—moderately slow; Ethan—moderately slow; Tetonka—slow
Available water capacity: Egan—high; Ethan—high; Tetonka—high
Content of organic matter: Egan—moderate; Ethan—moderately low; Tetonka—high
Surface runoff: Egan—low or medium; Ethan—medium; Tetonka—negligible

Minor Soils

- The somewhat poorly drained Chancellor soils on the lower toeslopes
- The well drained Clarno soils, which have more sand and less silt in the upper 24 to 40 inches than the Egan soils; in landform positions similar to those of the Egan soils
- The moderately well drained Davison and Trent soils on footslopes

Use and Management

Major use: About 90 percent of the association is cropland.
Other use: About 5 percent of the association is pasture or hayland.
Main crops: Alfalfa, corn, oats, and soybeans
Management concerns: Egan—water erosion on slopes of more than 2 percent; Ethan—wind erosion, water erosion, and the high content of lime, which adversely affects the availability of plant nutrients; Tetonka—wetness

5. Davison-Tetonka-Egan Association

Moderately well drained, poorly drained, and well drained, level to gently undulating, loamy and silty soils on till plains (fig. 3)

Composition

Percent of the survey area: 13
Extent of the components in the association:
Davison and similar soils—25 percent
Tetonka and similar soils—20 percent
Egan and similar soils—20 percent
Minor soils—35 percent

Setting

Landform: Till plains
Position on the landform: Davison—footslopes; Tetonka—basins; Egan—backslopes
Slope range: Davison—0 to 6 percent; Tetonka—0 to 1 percent; Egan—0 to 6 percent
Texture of the surface layer: Davison—loam; Tetonka—silt loam; Egan—silty clay loam

Soil Properties and Qualities

Drainage class: Davison—moderately well drained; Tetonka—poorly drained; Egan—well drained
Depth to bedrock: Davison—very deep; Tetonka—very deep; Egan—very deep
Depth to contrasting parent material: Davison—more than 60 inches; Tetonka—more than 60 inches; Egan—24 to 40 inches over loamy glacial till
Water table: Davison—at a depth of 2 to 4 feet; Tetonka—1 foot above to 1 foot below the surface; Egan—at a depth of more than 6 feet
Flooding: None
Ponding: Davison—none; Tetonka—frequent for long periods; Egan—none
Permeability: Davison—moderately slow; Tetonka—slow; Egan—moderately slow
Available water capacity: Davison—high; Tetonka—high; Egan—high
Content of organic matter: Davison—moderate; Tetonka—high; Egan—moderate
Surface runoff: Davison—low or medium; Tetonka—negligible; Egan—low or medium

Minor Soils

- The somewhat poorly drained Chancellor soils on the lower toeslopes
- The moderately well drained Trent soils on footslopes
- The well drained Ethan soils, which have free carbonates at or near the surface; on shoulder slopes
- The well drained Clarno soils, which have more sand and less silt in the upper 24 to 40 inches than the Egan soils; in landform positions similar to those of the Egan soils

Use and Management

Major use: About 90 percent of the association is cropland.
Other use: About 5 percent of the association is pasture or hayland.
Main crops: Alfalfa, corn, oats, and soybeans
Management concerns: Davison—wind erosion and the high content of lime, which adversely affects the availability of plant nutrients; Tetonka—wetness; Egan—water erosion on slopes of more than 2 percent

Moderately Well Drained, Somewhat Poorly Drained, and Poorly Drained, Level to Gently Undulating, Loamy, Silty, and Clayey Soils on Flood Plains

These soils formed in alluvium on the flood plain along the Vermillion River. They make up about 8 percent of the county. Areas are nearly level to gently sloping. Most areas are used for cultivated crops. Wetness is the main management concern.

6. Lex-Dalesburg-Clamo Association

Somewhat poorly drained, moderately well drained, and poorly drained, level to gently undulating, loamy and clayey soils on flood plains

Composition

Percent of the survey area: 3
Extent of the components in the association:
Lex and similar soils—25 percent
Dalesburg and similar soils—20 percent
Clamo and similar soils—20 percent
Minor soils—35 percent

Setting

Landform: Flood plains
Position on the landform: Lex—high flood plains; Dalesburg—high flood plains; Clamo—low flood plains
Slope range: Lex—0 to 2 percent; Dalesburg—0 to 4 percent; Clamo—0 to 1 percent
Texture of the surface layer: Lex—clay loam; Dalesburg—loam; Clamo—silty clay

Soil Properties and Qualities

Drainage class: Lex—somewhat poorly drained; Dalesburg—moderately well drained; Clamo—poorly drained
Depth to bedrock: Lex—very deep; Dalesburg—very deep; Clamo—very deep
Depth to contrasting parent material: Lex—20 to 40 inches over outwash sand and gravel; Dalesburg—more than 60 inches; Clamo—40 to more than 60 inches over loamy alluvium
Depth to the water table: Lex—1.5 to 3.0 feet; Dalesburg—3 to 6 feet; Clamo—0.5 foot to 1.5 feet
Flooding: Lex—occasional for brief periods; Dalesburg—occasional for brief periods; Clamo—occasional for long periods
Ponding: None
Permeability: Lex—moderate over very rapid; Dalesburg—rapid; Clamo—slow
Available water capacity: Lex—high; Dalesburg—moderate; Clamo—high
Content of organic matter: Lex—moderate; Dalesburg—moderate; Clamo—high
Surface runoff: Lex—low; Dalesburg—low; Clamo—very low

Minor Soils

- The somewhat poorly drained Lamo soils, which have more silt and clay and less sand than the Dalesburg soils; on high flood plains
- The poorly drained Baltic soils, which have free carbonates at or near the surface; in landform positions similar to those of the Clamo soils
- The poorly drained Luton soils, which are leached of free carbonates to a depth of more than 36 inches; in landform positions similar to those of the Clamo soils
- The somewhat poorly drained Dimo soils, which are leached of free carbonates to a depth of 20 to 40 inches; in landform positions similar to those of the Lex soils

Use and Management

Major use: About 95 percent of the association is cropland.
Other use: About 5 percent of the association is pasture or hayland.
Main crops: Alfalfa, corn, and soybeans
Management concerns: Lex—wetness; Dalesburg—moderate available water capacity, flooding; Clamo—wetness

7. Baltic-Luton-Lamo Association

Poorly drained and somewhat poorly drained, level and nearly level, clayey and silty soils on flood plains (fig. 3)

Composition

Percent of the survey area: 5

Extent of the components in the association:
Baltic and similar soils—35 percent
Luton and similar soils—25 percent
Lamo and similar soils—20 percent
Minor soils—20 percent

Setting

Landform: Flood plains
Position on the landform: Baltic—low flood plains; Luton—low flood plains; Lamo—high flood plains
Slope range: Baltic—0 to 1 percent; Luton—0 to 2 percent; Lamo—0 to 2 percent
Texture of the surface layer: Baltic—silty clay loam; Luton—silty clay; Lamo—silty clay loam

Soil Properties and Qualities

Drainage class: Baltic—poorly drained; Luton—poorly drained; Lamo—somewhat poorly drained
Depth to bedrock: Baltic—very deep; Luton—very deep; Lamo—very deep
Depth to contrasting parent material: Baltic—more than 60 inches; Luton—more than 60 inches; Lamo—40 to more than 60 inches over sandy alluvium
Water table: Baltic—at the surface to 1.5 feet below the surface; Luton—at the surface to 1 foot below the surface; Lamo—at a depth of 1.5 to 3.0 feet
Flooding: Baltic—occasional for brief periods; Luton—occasional for brief periods; Lamo—occasional for brief periods
Ponding: None
Permeability: Baltic—slow; Luton—very slow; Lamo—moderately slow
Available water capacity: Baltic—moderate; Luton—moderate; Lamo—high
Content of organic matter: Baltic—high; Luton—moderate; Lamo—moderate
Surface runoff: Baltic—very low; Luton—very low; Lamo—low

Minor Soils

- The poorly drained Clamo soils, which have free carbonates higher in the profile than the Luton soils but are leached to a lower depth than the Baltic soils; in landform positions similar to those of the major soils
- The poorly drained Albaton soils, which do not have a thick dark surface layer; in landform positions similar to those of the Baltic and Luton soils
- The somewhat poorly drained Chaska soils, which have more sand than the major soils; on high flood plains
- The moderately well drained Dalesburg soils, which have more sand and less silt and clay than the major soils; on high flood plains

Use and Management

Major use: About 90 percent of the association is cropland.
Other use: About 5 percent of the association is pasture or hayland.
Main crops: Alfalfa, corn, and soybeans
Management concerns: Baltic—wetness; Luton—wetness; Lamo—wetness, wind erosion

Well Drained, Moderately Well Drained, Somewhat Poorly Drained, and Poorly Drained, Level and Nearly Level, Silty and Clayey Soils on Flood Plains

These soils formed in alluvium on the flood plain along the Missouri River. They make up about 33 percent of the county. Areas are level and nearly level. Most areas are used for cultivated crops. Wetness, a moderate available water capacity, and a high content of lime and salt are the main management concerns.

8. Napa-Luton-Blyburg Association

Poorly drained and well drained, level and nearly level, clayey and silty soils on flood plains (fig. 6 and fig. 9)

Composition

Percent of the survey area: 2
Extent of the components in the association:
Napa and similar soils—30 percent
Luton and similar soils—30 percent
Blyburg and similar soils—15 percent
Minor soils—25 percent

Setting

Landform: Flood plains
Position on the landform: Napa—backswamps; Luton—backswamps; Blyburg—valley flats
Slope range: Napa—0 to 2 percent; Luton—0 to 2 percent; Blyburg—0 to 2 percent
Texture of the surface layer: Napa—silt loam; Luton—silty clay; Blyburg—silt loam

Soil Properties and Qualities

Drainage class: Napa—poorly drained; Luton—poorly drained; Blyburg—well drained

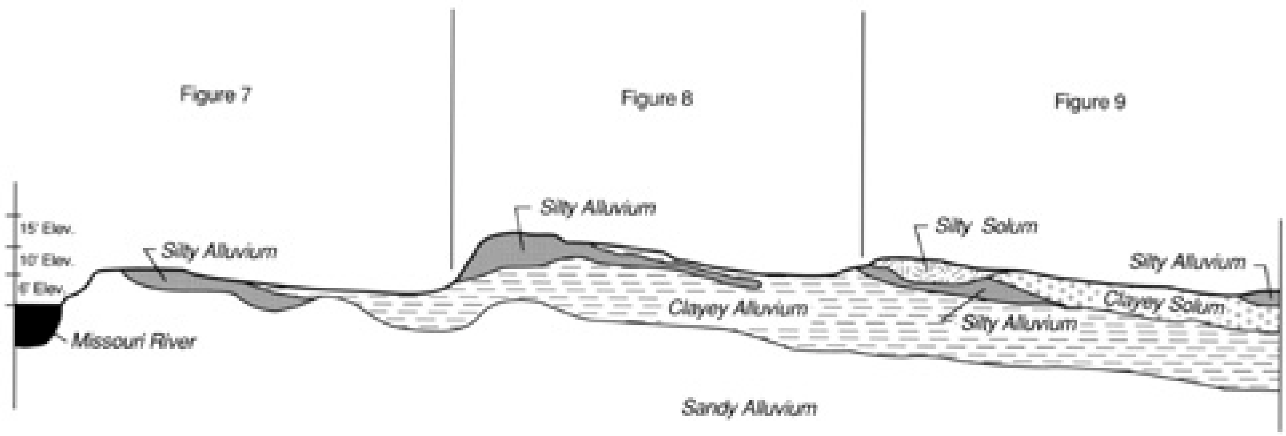

Figure 6.—Relationship of parent materials and position on the Missouri River flood plain. (See figures 7, 8, and 9 for more detailed information.)

Depth to bedrock: Napa—very deep; Luton—very deep; Blyburg—very deep
Depth to contrasting parent material: Napa—more than 60 inches; Luton—more than 60 inches; Blyburg—more than 60 inches
Water table: Napa—at the surface to 3 feet below the surface; Luton—at the surface to 1 foot below the surface; Blyburg—at a depth of more than 6 feet
Flooding: Napa—very rare; Luton—rare; Blyburg—very rare
Ponding: Napa—frequent for long periods; Luton—none; Blyburg—none
Permeability: Napa—very slow; Luton—very slow; Blyburg—moderate
Available water capacity: Napa—moderate; Luton—moderate; Blyburg—high
Content of organic matter: Napa—moderate; Luton—moderate; Blyburg—moderate
Surface runoff: Napa—very low; Luton—very low; Blyburg—low

Minor Soils

- The somewhat poorly drained Gayville soils, which have more clay in the surface layer than the major soils and have features associated with a high content of sodium; in landform positions slightly lower than those of the Blyburg soils
- The somewhat poorly drained Blencoe soils, which have less clay in the underlying material than the major soils; in landform positions slightly higher than those of the Luton soils
- The poorly drained Baltic soils, which have carbonates at or near the surface; on low flood plains
- The somewhat poorly drained Forney soils, which do not have a thick dark surface layer; on valley flats

Use and Management

Major use: About 50 percent of the association is cropland.
Other use: About 40 percent of the association is pasture, hayland, or rangeland.
Management concerns: Napa—wetness, high salt content; Luton—wetness; Blyburg—conserving moisture

9. Luton-Blencoe Association

Poorly drained and somewhat poorly drained, level and nearly level, clayey soils on flood plains (fig. 6 and fig. 9)

Composition

Percent of the survey area: 11
Extent of the components in the association:
Luton and similar soils—50 percent
Blencoe and similar soils—30 percent
Minor soils—20 percent

Setting

Landform: Flood plains
Position on the landform: Luton—backswamps; Blencoe—valley flats
Slope range: Luton—0 to 2 percent; Blencoe—0 to 2 percent
Texture of the surface layer: Luton—silty clay; Blencoe—silty clay

Soil Properties and Qualities

Drainage class: Luton—poorly drained; Blencoe—somewhat poorly drained

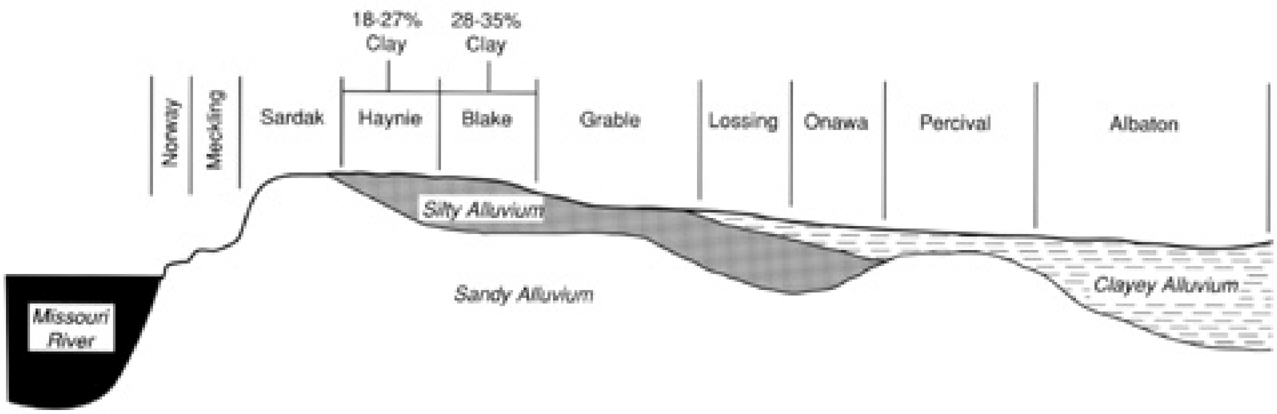

Figure 7.—Relationship of the major soils to parent material and position on the Missouri River flood plain.

Depth to bedrock: Luton—very deep; Blencoe—very deep
Depth to contrasting parent material: Luton—more than 60 inches; Blencoe—22 to 40 inches over loamy alluvium
Water table: Luton—at the surface to 1 foot below the surface; Blencoe—at a depth of 1.5 to 3.0 feet
Flooding: Luton—occasional for brief periods; Blencoe—very rare
Ponding: None
Permeability: Luton—very slow; Blencoe—slow
Available water capacity: Luton—moderate; Blencoe—high
Content of organic matter: Luton—moderate; Blencoe—moderate
Surface runoff: Luton—very low; Blencoe—low

Minor Soils

• The poorly drained Baltic soils, which have carbonates at or near the surface; on low flood plains
• The poorly drained Albaton soils, which do not have a thick dark surface layer; on valley flats
• The somewhat poorly drained Forney soils, which do not have a thick dark surface layer; on valley flats
• The well drained Blyburg soils on valley flats

Use and Management

Major use: About 75 percent of the association is cropland.
Other use: About 20 percent of the association is pasture or hayland.
Main crops: Alfalfa, corn, and soybeans
Management concerns: Wetness

10. James-Baltic Association

Poorly drained, level, clayey and silty soils on flood plains (fig. 6 and fig. 9)

Composition

Percent of the survey area: 1
Extent of the components in the association:
James and similar soils—35 percent
Baltic and similar soils—35 percent
Minor soils—30 percent

Setting

Landform: Flood plains
Position on the landform: James—low flood plains; Baltic—low flood plains
Slope range: James—0 to 1 percent; Baltic—0 to 1 percent
Texture of the surface layer: James—silty clay; Baltic—silty clay loam

Soil Properties and Qualities

Drainage class: James—poorly drained; Baltic—poorly drained
Depth to bedrock: James—very deep; Baltic—very deep
Depth to contrasting parent material: James—more than 60 inches; Baltic—more than 60 inches
Water table: James—at the surface to 1 foot below the surface; Baltic—at the surface to 1.5 feet below the surface
Flooding: James—frequent for long periods; Baltic—occasional for brief periods
Ponding: None

Permeability: James—slow or very slow; Baltic—slow
Available water capacity: James—moderate; Baltic—moderate
Content of organic matter: James—moderate; Baltic—high
Surface runoff: James—very low; Baltic—very low

Minor Soils

• The poorly drained Luton soils, which are leached of free carbonates to a lower depth than the major soils; in backswamps or in landform positions similar to those of the major soils
• The poorly drained Salmo soils, which have more silt and less clay than the major soils; in landform positions similar to those of the major soils
• The somewhat poorly drained Blencoe soils, which have less clay in the underlying material than the major soils; on valley flats
• The moderately well drained Bon soils on high flood plains

Use and Management

Major use: About 50 percent of the association is cropland.
Other use: About 40 percent of the association is pasture, hayland, or rangeland.
Management concerns: James—wetness and a high content of salt and lime, which adversely affects the availability of plant nutrients; Baltic—wetness

11. Owego-Lossing Association

Somewhat poorly drained and moderately well drained, level and nearly level, clayey soils on flood plains (fig. 6 and fig. 8)

Composition

Percent of the survey area: 7
Extent of the components in the association:
Owego and similar soils—30 percent
Lossing and similar soils—30 percent
Minor soils—40 percent

Setting

Landform: Flood plains
Position on the landform: Owego—valley flats; Lossing—valley flats
Slope range: Owego—0 to 2 percent; Lossing—0 to 2 percent
Texture of the surface layer: Owego—silty clay; Lossing—silty clay

Soil Properties and Qualities

Drainage class: Owego—somewhat poorly drained; Lossing—moderately well drained
Depth to bedrock: Owego—very deep; Lossing—very deep
Depth to contrasting parent material: Owego—more than 60 inches; Lossing—6 to 20 inches over loamy alluvium

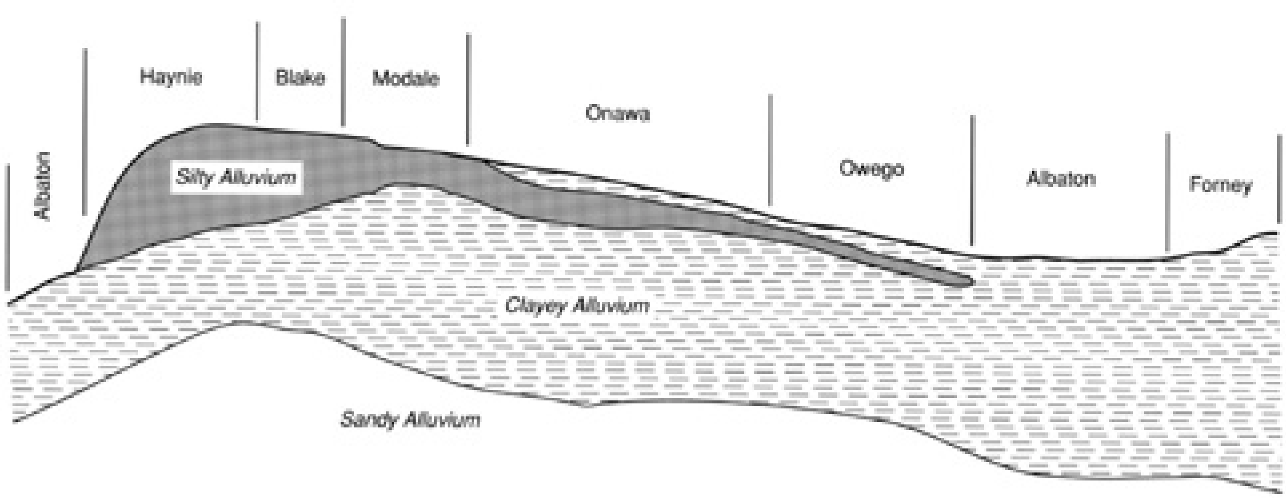

Figure 8.—Relationship of the major soils to parent material and position on the Missouri River flood plain.

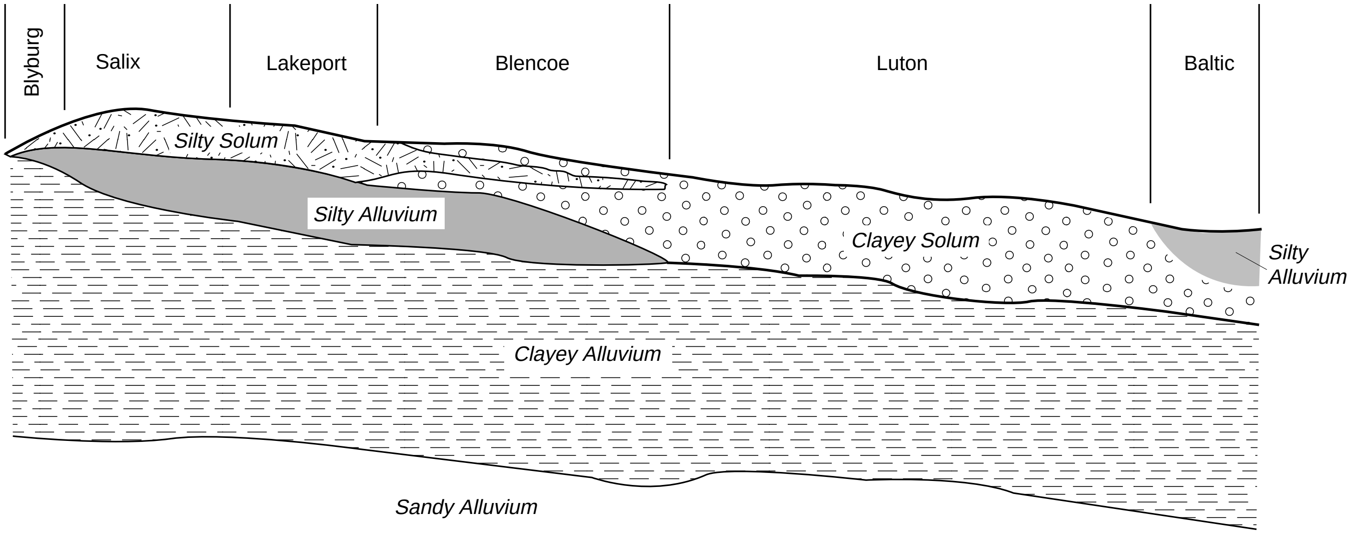

Figure 9.—Relationship of the major soils to parent material and position on the Missouri River flood plain.

Depth to the water table: Owego—1.5 to 3.0 feet; Lossing—3 to 5 feet
Flooding: Owego—very rare; Lossing—very rare
Ponding: None
Permeability: Owego—very slow; Lossing—slow
Available water capacity: Owego—moderate; Lossing—high
Content of organic matter: Owego—moderate; Lossing—moderate
Surface runoff: Owego—low; Lossing—low

Minor Soils

- The somewhat poorly drained Forney soils, which are clayey throughout; in landform positions similar to those of the major soils
- The moderately well drained Onawa soils, which have clayey textures at a depth of 18 to 30 inches; in landform positions similar to those of the Lossing soils
- The moderately well drained Vore soils, which have sandy underlying material; in landform positions similar to those of the major soils
- The well drained Haynie soils on valley flats

Use and Management

Major use: About 90 percent of the association is cropland.
Other use: About 5 percent of the association is pasture or hayland.
Main crops: Alfalfa, corn, and soybeans
Management concerns: Owego—wetness; Lossing—conserving moisture

12. Haynie-Onawa-Grable Association

Well drained and moderately well drained, nearly level and level, silty and clayey soils on flood plains (fig. 6 and fig. 7)

Composition

Percent of the survey area: 9
Extent of the components in the association:
Haynie and similar soils—25 percent
Onawa and similar soils—20 percent
Grable and similar soils—20 percent
Minor soils—35 percent

Setting

Landform: Flood plains
Position on the landform: Haynie—valley flats; Onawa—valley flats; Grable—valley flats
Slope range: Haynie—0 to 2 percent; Onawa—0 to 2 percent; Grable—0 to 2 percent
Texture of the surface layer: Haynie—silt loam; Onawa—silty clay; Grable—silt loam

Soil Properties and Qualities

Drainage class: Haynie—well drained; Onawa—moderately well drained; Grable—well drained
Depth to bedrock: Haynie—very deep; Onawa—very deep; Grable—very deep
Depth to contrasting parent material: Haynie—40 to more than 60 inches over sandy alluvium;

Onawa—18 to 30 inches over loamy alluvium; Grable—18 to 30 inches over sandy alluvium
Depth to the water table: Haynie—more than 6 feet; Onawa—3 to 5 feet; Grable—more than 6 feet
Flooding: Haynie—very rare; Onawa—very rare; Grable—very rare
Ponding: None
Permeability: Haynie—moderate; Onawa—slow; Grable—moderate over rapid
Available water capacity: Haynie—high; Onawa—high; Grable—moderate
Content of organic matter: Haynie—moderately low; Onawa—moderate; Grable—moderately low
Surface runoff: Haynie—low; Onawa—low; Grable—low

Minor Soils

- The somewhat poorly drained Forney soils, which are clayey throughout; on valley flats
- The moderately well drained Lossing soils, which have a clayey surface layer at a depth of 5 to 10 inches; on valley flats
- The moderately well drained Vore soils, which have sandy underlying material; on valley flats
- The excessively drained Sardak soils, which are sandy throughout; on valley flats

Use and Management

Major use: About 95 percent of the association is cropland.
Other use: About 5 percent of the association is pasture or hayland.
Main crops: Alfalfa, corn, and soybeans
Management concerns: Haynie—conserving moisture; Onawa and Grable—moderate available water capacity

13. Forney-Albaton-Salix Association

Somewhat poorly drained, poorly drained, and moderately well drained, level and nearly level, clayey and silty soils on flood plains (fig. 6 and fig. 8)

Composition

Percent of the survey area: 3
Extent of the components in the association:
Forney and similar soils—30 percent
Albaton and similar soils—25 percent
Salix and similar soils—15 percent
Minor soils—30 percent

Setting

Landform: Flood plains
Position on the landform: Forney—valley flats; Albaton—valley flats; Salix—valley flats
Slope range: Forney—0 to 2 percent; Albaton—0 to 2 percent; Salix—0 to 2 percent
Texture of the surface layer: Forney—silty clay; Albaton—silty clay; Salix—silty clay loam

Soil Properties and Qualities

Drainage class: Forney—somewhat poorly drained; Albaton—poorly drained; Salix—moderately well drained
Depth to bedrock: Forney—very deep; Albaton—very deep; Salix—very deep
Depth to contrasting parent material: Forney—more than 60 inches; Albaton—more than 60 inches; Salix—more than 60 inches
Water table: Forney—at a depth of 1.5 to 3.0 feet; Albaton—at the surface to 3 feet below the surface; Salix—at a depth of 4 to 6 feet
Flooding: Forney—very rare; Albaton—very rare; Salix—very rare
Ponding: Forney—none; Albaton—frequent for long periods; Salix—none
Permeability: Forney—very slow; Albaton—very slow; Salix—moderate
Available water capacity: Forney—moderate; Albaton—moderate; Salix—high
Content of organic matter: Forney—moderate; Albaton—moderate; Salix—moderate
Surface runoff: Forney—medium; Albaton—low; Salix—low

Minor Soils

- The well drained Blyburg soils, which have a thinner dark surface layer than the major soils and are more stratified; in landform positions similar to those of the Salix soils
- The moderately well drained Lakeport soils, which have more clay than the major soils; on valley flats
- The moderately well drained Onawa soils, which have less clay in the underlying material than the major soils; in landform positions similar to those of the Albaton soils
- The somewhat poorly drained Owego soils, which have horizons containing less than 35 percent clay above a depth of 24 inches; in landform positions similar to those of the Forney soils

Use and Management

Major use: About 90 percent of the association is cropland.
Other use: About 5 percent of the association is pasture or hayland.
Main crops: Alfalfa, corn, and soybeans
Management concerns: Forney and Albaton—wetness; Salix—conserving moisture

Detailed Soil Map Units

The map units delineated on the detailed soil maps in this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses. More information about each map unit is given under the heading “Use and Management of the Soils.”

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils and miscellaneous areas are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some “included” areas that belong to other taxonomic classes.

Most included soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, inclusions. They may or may not be mentioned in the map unit description. Other included soils and miscellaneous areas, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, inclusions. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The included areas of contrasting soils or miscellaneous areas are mentioned in the map unit descriptions. A few included areas may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of included areas in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans, but if intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a ***soil series***. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into ***soil phases***. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Sardak loamy fine sand, 2 to 9 percent slopes, is a phase of the Sardak series.

In Clay County, many of the soils on the flood plain along the Missouri River are one drainage class better (i.e., moderately well drained instead of somewhat poorly drained) than is typical for the series. This difference is a result of downcutting by the river.

Some map units are made up of two or more major soils. These map units are called ***complexes***. A complex consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils are somewhat similar in all areas. Egan-Ethan-Trent complex, 1 to 6 percent slopes, is an example.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see Contents) give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

Ac—Albaton silty clay, 0 to 2 percent slopes

Composition

Albaton and similar soils: 80 to 90 percent
Contrasting inclusions: 10 to 20 percent

Setting

Landform: Flood plains
Position on the landform: Valley flats
Slope range: 0 to 2 percent
Shape of areas: Elongated or irregular
Size of areas: 10 to 1,000 acres

Typical Profile

Surface layer:
0 to 9 inches—dark grayish brown, calcareous silty clay with redox concentrations in the lower part

Underlying layer:
9 to 80 inches—grayish brown, calcareous silty clay with thin strata of silty clay loam, silt loam, and very fine sandy loam and with redox concentrations

Soil Properties and Qualities

Drainage class: Poorly drained
Depth to bedrock: Very deep
Depth to contrasting parent material: More than 60 inches
Water table: At the surface to 3 feet below the surface
Flooding: Very rare
Ponding: None
Permeability: Very slow
Available water capacity: Moderate
Content of organic matter: Moderate
Surface runoff: Low

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Forney soils, which have dark buried horizons; in positions on the landform similar to those of the Albaton soil
• The somewhat poorly drained Owego soils, which have a layer of loamy material above a depth of 24 inches; in positions on the landform similar to those of the Albaton soil
• The moderately well drained Onawa soils, which have loamy underlying layers; in positions on the landform similar to those of the Albaton soil

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Fairly well suited
Management concerns: Wetness
Management measures:
• In most years this soil is better suited to late-planted crops than to other crops. Leaving crop residue on the surface and deferring tillage when the soil is wet help to maintain tilth and minimize surface compaction.
• Rotations that include grasses and legumes help to control erosion and maintain tilth and the content of organic matter. Maintaining existing drainage systems helps to remove excess water.

Interpretive Groups

Land capability classification: IIIw
Range site: Clayey Overflow
Windbreak suitability group: 2K
Pasture suitability group: A

Ad—Albaton silty clay, depressional

Composition

Albaton and similar soils: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Flood plains
Position on the landform: Old channels or oxbows
Slope range: 0 to 1 percent
Shape of areas: Irregular
Size of areas: 10 to 250 acres

Typical Profile

Surface layer:
0 to 9 inches—dark grayish brown, calcareous silty clay with redox concentrations in the lower part

Underlying layer:
9 to 80 inches—grayish brown, calcareous silty clay with thin strata of silty clay loam, silt loam, and very fine sandy loam and with redox concentrations

Soil Properties and Qualities

Drainage class: Very poorly drained
Depth to bedrock: Very deep
Depth to contrasting parent material: More than 60 inches
Water table: 1 foot above to 3 feet below the surface
Flooding: Very rare
Ponding: Frequent for long periods
Permeability: Very slow
Available water capacity: Moderate
Content of organic matter: Moderate
Surface runoff: Negligible
Other features: This soil is in old meander channels on the flood plain along the Missouri River. Areas of the soil are inundated from heavy rains and snowfall.

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Owego soils, which have a layer of loamy material above a depth of 24 inches; on valley flats
• The somewhat poorly drained Forney soils, which have dark buried horizons; on valley flats
• The moderately well drained Percival soils, which have sandy material at a depth of 15 to 30 inches; on valley flats
• The moderately well drained Onawa soils, which have loamy underlying layers; on valley flats

Use and Management

Wildlife habitat, rangeland, pasture

Management concerns: Wetness
Management measures:
• In most years this soil is better suited to late-planted crops or to water-tolerant pasture plants than to other plants. Proper grazing management helps to maintain plant vigor.
• Restricting grazing or planting during wet periods helps to minimize surface compaction. Maintaining existing drainage systems helps to remove excess water.

Interpretive Groups

Land capability classification: Vw
Range site: Wetland
Windbreak suitability group: 10
Pasture suitability group: B2

AeA—Alcester silty clay loam, 0 to 2 percent slopes

Composition

Alcester and similar soils: 75 to 90 percent
Contrasting inclusions: 10 to 25 percent

Setting

Landform: Alluvial terraces or colluvial fans
Position on the landform: Footslopes
Slope range: 0 to 2 percent
Shape of areas: Elongated or irregular
Size of areas: 10 to 200 acres

Typical Profile

Surface soil:
0 to 13 inches—very dark gray silty clay loam

Subsoil:
13 to 25 inches—dark gray silty clay loam
25 to 38 inches—dark gray silty clay loam with redox concentrations
38 to 58 inches—gray, calcareous clay loam with redox concentrations
58 to 71 inches—dark gray, calcareous clay loam with redox concentrations

Underlying layer:
71 to 80 inches—light olive brown calcareous silty clay loam with redox concentrations

Soil Properties and Qualities

Drainage class: Moderately well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: 40 to more than 60 inches over clayey alluvium
Depth to the water table: 3 to 6 feet
Flooding: Rare
Ponding: None
Permeability: Moderate
Available water capacity: High
Content of organic matter: High
Surface runoff: Low

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Lamo soils, which have free carbonates at or near the surface; on high flood plains
• The moderately well drained Roxbury soils, which

have free carbonates at or near the surface; on high flood plains
- The poorly drained Clamo and Baltic soils on low flood plains

Similar inclusions:
- Soils that have more sand and less silt

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Well suited
Management concerns: The soil is subject to rare flooding.
Management measures:
- Managing crop residue conserves moisture and helps to maintain tilth and the content of organic matter.

Interpretive Groups

Land capability classification: I
Range site: Loamy Overflow
Windbreak suitability group: 1
Pasture suitability group: K

Ba—Baltic silty clay loam, 0 to 1 percent slopes

Composition

Baltic and similar soils: 80 to 95 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Flood plains
Position on the landform: Low flood plains
Slope range: 0 to 1 percent
Shape of areas: Irregular
Size of areas: 10 to 1,000 acres

Typical Profile

Surface soil:
0 to 18 inches—very dark gray, calcareous silty clay loam with oxidized concentrations

Subsoil:
18 to 25 inches—very dark gray, calcareous silty clay loam with masses of gypsum and other salts
25 to 45 inches—very dark gray, calcareous silty clay loam
45 to 56 inches—dark gray, calcareous silty clay loam

Underlying layer:
56 to 80 inches—dark gray, calcareous silty clay loam

Soil Properties and Qualities

Drainage class: Poorly drained
Depth to bedrock: Very deep
Depth to contrasting parent material: More than 60 inches
Water table: At the surface to 1.5 feet below the surface
Flooding: Occasional for long periods
Ponding: None
Permeability: Slow
Available water capacity: Moderate
Content of organic matter: High
Surface runoff: Very low
Other properties: This soil has a high content of lime.

Inclusions

Contrasting inclusions:
- The poorly drained Clamo soils, which are leached of free carbonates to a depth of 14 to 30 inches; in positions on the landform similar to those of the Baltic soil
- The somewhat poorly drained Lamo soils on high flood plains
- The poorly drained Luton soils, which are leached of free carbonates to a depth of more than 36 inches; in positions on the landform similar to those of the Baltic soil
- The somewhat poorly drained Lex soils, which have gravelly material at a depth of 20 to 40 inches; on high flood plains

Similar inclusions:
- Soils that have salts at or near the surface

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Fairly well suited
Management concerns: Wetness
Management measures:
- In wet years this soil is better suited to late-planted crops than to other crops. Leaving crop residue on the surface and deferring tillage or haying help to maintain tilth and minimize surface compaction.

Interpretive Groups

Land capability classification: IIIw
Range site: Clayey Overflow
Windbreak suitability group: 2K
Pasture suitability group: A

Bb—Blake silty clay loam, 0 to 2 percent slopes

Composition

Blake and similar soils: 75 to 90 percent
Contrasting inclusions: 10 to 25 percent

Setting

Landform: Flood plains
Position on the landform: Valley flats
Slope range: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 10 to 100 acres

Typical Profile

Surface layer:
0 to 9 inches—gray, calcareous silty clay loam

Underlying layers:
9 to 25 inches—grayish brown, calcareous silty clay loam with redox concentrations
25 to 43 inches—light brownish gray (with redox concentrations), calcareous silt loam with thin strata of very fine sandy loam and silty clay loam
43 to 80 inches—light brownish gray (with redox concentrations), calcareous very fine sandy loam with thin strata of silt loam and silty clay loam

Soil Properties and Qualities

Drainage class: Moderately well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: 40 to more than 60 inches over sandy alluvium
Depth to the water table: 3 to 5 feet
Flooding: Very rare
Ponding: None
Permeability: Moderate
Available water capacity: High
Content of organic matter: Moderately low
Surface runoff: Low

Inclusions

Contrasting inclusions:
- The well drained Haynie soils, which have less clay than the Blake soil; in positions on the landform similar to those of the Blake soil
- The moderately well drained Modale soils, which have clayey underlying material; in positions on the landform similar to those of the Blake soil
- The well drained Grable soils, which have less clay than the Blake soil and have sandy underlying material; in positions on the landform similar to those of the Blake soil
- The moderately well drained Lossing soils on valley flats

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Well suited
Management concerns: Conserving moisture
Management measures:
- Crop residue management conserves moisture and helps to maintain tilth and the content of organic matter.

Interpretive Groups

Land capability classification: I
Range site: Silty
Windbreak suitability group: 1K
Pasture suitability group: F

Bf—Blencoe silty clay, 0 to 2 percent slopes, clayey substratum

Composition

Blencoe and similar soils: 75 to 85 percent
Contrasting inclusions: 15 to 25 percent

Setting

Landform: Flood plains
Position on the landform: Valley flats
Slope range: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 20 to 1,000 acres

Typical Profile

Surface soil:
0 to 15 inches—very dark gray silty clay

Subsoil:
15 to 23 inches—dark gray silty clay with redox concentrations
23 to 33 inches—gray silty clay with redox concentrations

Underlying layers:
33 to 42 inches—light yellowish brown, calcareous silt loam with redox concentrations
42 to 80 inches—gray, calcareous silty clay with threads of salt and slickensides and with redox concentrations

Soil Properties and Qualities

Drainage class: Somewhat poorly drained

Depth to bedrock: Very deep
Depth to contrasting parent material: 22 to 40 inches over loamy alluvium
Depth to the water table: 1.5 to 3.0 feet
Flooding: Very rare
Ponding: None
Permeability: Slow
Available water capacity: High
Content of organic matter: Moderate
Surface runoff: Low

Inclusions

Contrasting inclusions:
- The poorly drained Luton soils, which do not have loamy textures in the profile; in landform positions slightly lower than those of the Blencoe soil
- The poorly drained Napa soils, which do not have loamy textures in the profile and have features associated with a high content of sodium; in landform positions slightly lower than those of the Blencoe soil
- The well drained Blyburg soils on valley flats

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Well suited
Management concerns: Wetness
Management measures:
- In wet years this soil is better suited to late-planted crops than to other crops. Leaving crop residue on the surface and deferring tillage when the soil is wet help to maintain tilth and minimize surface compaction.
- Rotations that include grasses and legumes help to control erosion and maintain fertility, tilth, and the content of organic matter.

Interpretive Groups

Land capability classification: IIw
Range site: Clayey Overflow
Windbreak suitability group: 2
Pasture suitability group: A

Bg—Blyburg silt loam, 0 to 2 percent slopes

Composition

Blyburg and similar soils: 80 to 95 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Flood plains
Position on the landform: Valley flats
Slope range: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 25 to 750 acres

Typical Profile

Surface layer:
0 to 8 inches—dark grayish brown silt loam

Subsurface layer:
8 to 18 inches—dark grayish brown, calcareous silt loam

Underlying layers:
18 to 44 inches—light yellowish brown (with redox concentrations), calcareous silt loam with thin strata of very fine sandy loam and silty clay loam
44 to 80 inches—pale yellow (with redox concentrations), calcareous very fine sandy loam with thin strata of silt loam and loamy very fine sand in the upper part; olive, calcareous silty clay with thin strata of silty clay loam, silt loam, and very fine sandy loam in the lower part

Soil Properties and Qualities

Drainage class: Well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: More than 60 inches
Depth to the water table: More than 6 feet
Flooding: Very rare
Ponding: None
Permeability: Moderate
Available water capacity: High
Content of organic matter: Moderate
Surface runoff: Low

Inclusions

Contrasting inclusions:
- The well drained Haynie soils, which have a dark surface layer less than 10 inches thick and are more stratified than the Blyburg soil; in positions on the landform similar to those of the Blyburg soil
- The somewhat poorly drained Gayville soils, which have more clay in the surface layer than the Blyburg soil and have features associated with a high content of sodium; on valley flats
- The somewhat poorly drained Blencoe soils, which have more clay in the surface layer than the Blyburg soil; in backswamps
- The moderately well drained Blake soils in positions on the landform similar to those of the Blyburg soil

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Well suited

Management concerns: Conserving moisture
Management measures:
• Crop residue management conserves moisture and helps to maintain tilth and the content of organic matter.

Interpretive Groups

Land capability classification: I
Range site: Silty
Windbreak suitability group: 1
Pasture suitability group: F

Bk—Blyburg-Gayville silt loams, 0 to 2 percent slopes

Composition

Blyburg and similar soils: 45 to 55 percent
Gayville and similar soils: 20 to 35 percent
Contrasting inclusions: 10 to 25 percent

Setting

Landform: Flood plains
Position on the landform: Valley flats
Slope range: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 10 to 500 acres

Typical Profile

Blyburg

Surface layer:
0 to 8 inches—dark grayish brown silt loam

Subsurface layer:
8 to 18 inches—dark grayish brown, calcareous silt loam

Underlying layers:
18 to 44 inches—light yellowish brown (with redox concentrations), calcareous silt loam with thin strata of very fine sandy loam and silty clay loam
44 to 80 inches—pale yellow (with redox concentrations), calcareous very fine sandy loam with thin strata of silt loam and loamy very fine sand in the upper part; olive, calcareous silty clay with thin strata of silty clay loam, silt loam, and very fine sandy loam in the lower part

Gayville

Surface layer:
0 to 1 inch—gray silt loam

Subsoil:
1 to 7 inches—very dark gray, calcareous silty clay with masses of gypsum
7 to 12 inches—dark gray, calcareous silty clay with masses of gypsum
12 to 18 inches—grayish brown, calcareous silty clay loam with redox concentrations and masses of gypsum
18 to 31 inches—pale yellow, calcareous loam with masses of gypsum, redox concentrations, and redox depletions

Underlying layer:
31 to 80 inches—pale yellow (with redox concentrations and redox depletions), calcareous very fine sandy loam with thin strata of silt loam and silty clay loam

Soil Properties and Qualities

Drainage class: Blyburg—well drained; Gayville—somewhat poorly drained
Depth to bedrock: Very deep
Depth to contrasting parent material: More than 60 inches
Depth to the water table: Blyburg—more than 6 feet; Gayville—1.5 to 3.0 feet
Flooding: Very rare
Ponding: None
Permeability: Blyburg—moderate; Gayville—very slow
Available water capacity: Blyburg—high; Gayville—moderate
Content of organic matter: Moderate
Surface runoff: Low
Other properties: A sodium-affected subsoil restricts root penetration and the rate of water infiltration in the Gayville soil.

Inclusions

Contrasting inclusions:
• The poorly drained Napa soils, which are clayey throughout; in backswamps
• The moderately well drained Blake soils in positions on the landform similar to those of the Blyburg soil
• The somewhat poorly drained Blencoe soils, which are not sodium affected; in backswamps
• The poorly drained Luton soils, which are not sodium affected; in backswamps

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Blyburg—fairly well suited; Gayville—generally unsuited
Management concerns: Blyburg—conserving moisture; Gayville—the sodium-affected subsoil, which adversely affects crop growth by restricting

the penetration of plant roots and the rate of water infiltration

Management measures:

• Leaving crop residue on the surface, minimizing tillage, tilling in a timely manner, and including grasses and legumes in the cropping system conserve moisture and help to maintain tilth and the content of organic matter.

• In most years the Gayville soil is better suited to late-planted crops than to other crops. Chiseling or subsoiling when the Gayville soil is dry can increase the rate of water infiltration. Salt-tolerant crops or grasses should be planted. Permanent pasture or hayland species should be established.

Interpretive Groups

Land capability classification: Blyburg—I; Gayville—VIs
Range site: Blyburg—Silty; Gayville—Saline Lowland
Windbreak suitability group: Blyburg—1; Gayville—9W
Pasture suitability group: Blyburg—F; Gayville—J

Bm—Bon loam, 0 to 2 percent slopes

Composition

Bon and similar soils: 80 to 95 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Flood plains
Position on the landform: High flood plains
Slope range: 0 to 2 percent
Shape of areas: Elongated
Size of areas: 10 to 100 acres

Typical Profile

Surface soil:
0 to 15 inches—dark gray, calcareous loam

Subsoil:
15 to 33 inches—very dark gray, calcareous loam
33 to 56 inches—dark gray, calcareous loam

Underlying layers:
56 to 60 inches—grayish brown, calcareous loam with redox concentrations
60 to 80 inches—grayish brown, calcareous clay loam with redox concentrations

Soil Properties and Qualities

Drainage class: Well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: 40 to more than 60 inches over outwash sand and gravel or clayey alluvium
Depth to the water table: More than 6 feet
Flooding: Rare
Ponding: None
Permeability: Moderate
Available water capacity: High
Content of organic matter: High
Surface runoff: Low

Inclusions

Contrasting inclusions:

• The moderately well drained Davison soils on footslopes

• The moderately well drained Davis soils, which are leached of free carbonates to a depth of 20 to more than 50 inches; on footslopes

Similar inclusions:

• Soils that have less sand and more silt

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Well suited
Management concerns: Conserving moisture
Management measures:

• Crop residue management conserves moisture and helps to maintain tilth and the content of organic matter.

Interpretive Groups

Land capability classification: I
Range site: Loamy Overflow
Windbreak suitability group: 1
Pasture suitability group: K

Bn—Bon loam, channeled

Composition

Bon and similar soils: 80 to 95 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Flood plains
Position on the landform: High flood plains
Slope range: 0 to 2 percent
Shape of areas: Elongated
Size of areas: 10 to 100 acres

Typical Profile

Surface soil:
0 to 15 inches—dark gray, calcareous loam

Subsoil:
15 to 33 inches—very dark gray, calcareous loam
33 to 56 inches—dark gray, calcareous loam

Underlying layers:
56 to 60 inches—grayish brown, calcareous loam with redox concentrations
60 to 80 inches—grayish brown, calcareous clay loam with redox concentrations

Soil Properties and Qualities

Drainage class: Moderately well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: 40 to more than 60 inches over outwash sand and gravel
Depth to the water table: 3 to 5 feet
Flooding: Frequent for brief periods
Ponding: None
Permeability: Moderate
Available water capacity: High
Content of organic matter: High
Surface runoff: Low
Other features: Areas of this soil typically are dissected by a meandering channel.

Inclusions

Contrasting inclusions:
• The moderately well drained Davison soils on footslopes
• The moderately well drained Davis soils, which are leached of free carbonates to a depth of 20 to more than 50 inches; on footslopes

Similar inclusions:
• Soils that have less sand and more silt

Use and Management

Rangeland and pasture

Suitability for crops: Generally unsuited
Management concerns: Wetness and meandering channels, which limit cultivation
Management measures:
• Proper grazing management helps to maintain plant vigor.

Interpretive Groups

Land capability classification: VIw
Range site: Loamy Overflow
Windbreak suitability group: 1
Pasture suitability group: NS

Ca—Chancellor-Tetonka complex, 0 to 2 percent slopes

Composition

Chancellor and similar soils: 55 to 70 percent
Tetonka and similar soils: 20 to 30 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Till plains
Position on the landform: Chancellor—lower toeslopes; Tetonka—basins
Slope range: Chancellor—0 to 2 percent; Tetonka—0 to 1 percent
Shape of areas: Elongated
Size of areas: 5 to 100 acres

Typical Profile

Chancellor

Surface layer:
0 to 10 inches—very dark gray silty clay loam

Subsoil:
10 to 30 inches—pale yellow silty clay with redox concentrations
30 to 41 inches—grayish brown silty clay with nests of gypsum in the lower 5 inches and with redox concentrations
41 to 54 inches—light yellowish brown and light olive gray, calcareous silty clay loam with redox concentrations
54 to 69 inches—light olive gray, calcareous clay loam with redox concentrations

Underlying layer:
69 to 80 inches—light olive gray, calcareous clay loam with redox concentrations and redox depletions

Tetonka

Surface layer:
0 to 8 inches—dark gray silt loam

Subsurface layer:
8 to 12 inches—gray silt loam

Subsoil:
12 to 20 inches—gray silt loam
20 to 31 inches—gray silty clay
31 to 59 inches—gray silty clay with redox concentrations

Underlying layer:
59 to 80 inches—gray silty clay loam with redox concentrations

Soil Properties and Qualities

Drainage class: Chancellor—somewhat poorly drained; Tetonka—poorly drained
Depth to bedrock: Very deep
Depth to contrasting parent material: Chancellor—40 to more than 60 inches over loamy glacial till; Tetonka—more than 60 inches
Water table: Chancellor—at a depth of 1 to 2 feet; Tetonka—1 foot above to 1 foot below the surface
Flooding: Chancellor—frequent for brief periods; Tetonka—none
Ponding: Chancellor—none; Tetonka—frequent for long periods
Permeability: Slow
Available water capacity: High
Content of organic matter: High
Surface runoff: Chancellor—low; Tetonka—negligible

Inclusions

Contrasting inclusions:
- The moderately well drained Davison and Wakonda soils on footslopes
- The somewhat poorly drained Whitewood soils on toeslopes

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Fairly well suited
Management concerns: Wetness
Management measures:
- In wet years these soils are better suited to late-planted crops than to other crops. Leaving crop residue on the surface and deferring tillage when the soils are wet help to maintain tilth and minimize surface compaction.
- Maintaining existing drainage systems helps to remove excess water.

Interpretive Groups

Land capability classification: Chancellor—IIw; Tetonka—IVw
Range site: Chancellor—Loamy Overflow; Tetonka—Wet Meadow
Windbreak suitability group: Chancellor—2; Tetonka—10
Pasture suitability group: Chancellor—A; Tetonka—B2

Cc—Chaska silt loam, channeled

Composition

Chaska and similar soils: 70 to 80 percent
Contrasting inclusions: 20 to 30 percent

Setting

Landform: Flood plains
Position on the landform: High flood plains
Slope range: 0 to 2 percent
Shape of areas: Elongated
Size of areas: 10 to 100 acres

Typical Profile

Surface layer:
0 to 7 inches—dark gray, calcareous silt loam

Underlying layers:
7 to 43 inches—dark gray, dark grayish brown, and brown, calcareous silt loam with strata of loamy fine sand, very fine sandy loam, and silty clay loam and with redox concentrations
43 to 80 inches—dark gray and brown, calcareous loam with strata of very fine sandy loam and with redox concentrations

Soil Properties and Qualities

Drainage class: Somewhat poorly drained
Depth to bedrock: Very deep
Depth to contrasting parent material: 40 to more than 60 inches over sandy alluvium
Depth to the water table: 1.5 to 2.5 feet
Flooding: Frequent for long periods
Ponding: None
Permeability: Moderate
Available water capacity: High
Content of organic matter: Moderate
Surface runoff: Low
Other features: Areas of this soil typically are dissected by a meandering channel.

Inclusions

Contrasting inclusions:
- The somewhat poorly drained Lamo soils, which have more silt and less sand than the Chaska soil; on high flood plains
- The poorly drained Clamo soils, which have more clay and less sand than the Chaska soil; on low flood plains
- The moderately well drained Roxbury soils, which have more silt and less sand than the Chaska soil; in

positions on the landform similar to those of the Chaska soil
• The moderately well drained Bon soils in positions on the landform similar to those of the Chaska soil

Use and Management

Rangeland, pasture, wildlife habitat

Suitability for crops: Generally unsuited
Management concerns: Wetness and meandering channels, which limit cultivation
Management measures:
• Proper grazing management helps to maintain plant vigor.

Interpretive Groups

Land capability classification: VIw
Range site: Subirrigated
Windbreak suitability group: 1K
Pasture suitability group: NS

Cd—Clamo silty clay, 0 to 1 percent slopes

Composition

Clamo and similar soils: 75 to 90 percent
Contrasting inclusions: 10 to 25 percent

Setting

Landform: Flood plains
Position on the landform: Low flood plains
Slope range: 0 to 1 percent
Shape of areas: Irregular
Size of areas: 10 to 500 acres

Typical Profile

Surface soil:
0 to 13 inches—very dark gray silty clay with redox concentrations in the lower 5 inches

Subsoil:
13 to 23 inches—very dark gray silty clay with redox concentrations
23 to 34 inches—very dark gray, calcareous silty clay with redox concentrations
34 to 54 inches—dark gray and olive gray, calcareous silty clay with redox concentrations

Underlying layers:
54 to 62 inches—light brownish gray, calcareous silty clay with redox concentrations and redox depletions
62 to 80 inches—light gray, calcareous clay loam with redox concentrations and redox depletions

Soil Properties and Qualities

Drainage class: Poorly drained
Depth to bedrock: Very deep
Depth to contrasting parent material: 40 to more than 60 inches over loamy alluvium
Depth to the water table: 0.5 foot to 1.5 feet
Flooding: Occasional for long periods
Ponding: None
Permeability: Slow
Available water capacity: High
Content of organic matter: High
Surface runoff: Very low

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Lamo soils, which have free carbonates at or near the surface and have less clay than the Clamo soil; on high flood plains
• The poorly drained Luton soils, which are leached of free carbonates to a depth of more than 36 inches; in positions on the landform similar to those of the Clamo soil
• The poorly drained Baltic soils, which have free carbonates at or near the surface; in positions on the landform similar to those of the Clamo soil

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Fairly well suited
Management concerns: Wetness
Management measures:
• In wet years this soil is better suited to late-planted crops than to other crops. Leaving crop residue on the surface and deferring tillage when the soil is wet help to maintain tilth and minimize surface compaction.
• Rotations that include grasses and legumes help to control erosion and maintain tilth and the content of organic matter. Maintaining existing drainage systems helps to remove excess water.

Interpretive Groups

Land capability classification: IIIw
Range site: Clayey Overflow
Windbreak suitability group: 10
Pasture suitability group: B1

DaA—Dalesburg loam, 0 to 2 percent slopes

Composition

Dalesburg and similar soils: 80 to 90 percent

Contrasting inclusions: 10 to 20 percent

Setting

Landform: Flood plains
Position on the landform: High flood plains
Slope range: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 5 to 250 acres

Typical Profile

Surface soil:
0 to 14 inches—dark gray loam

Subsoil:
14 to 24 inches—very dark grayish brown sandy loam
24 to 34 inches—dark grayish brown sandy loam with redox concentrations

Underlying layers:
34 to 62 inches—brown and pale brown, calcareous loamy sand with redox concentrations
62 to 80 inches—brown, calcareous gravelly sand with redox concentrations

Soil Properties and Qualities

Drainage class: Moderately well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: More than 60 inches
Depth to the water table: 3 to 6 feet
Flooding: Occasional for brief periods
Ponding: None
Permeability: Rapid
Available water capacity: Moderate
Content of organic matter: Moderate
Surface runoff: Low

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Dimo soils on high flood plains
• The somewhat poorly drained Lamo soils, which have more silt and clay and less sand than the Dalesburg soil; on high flood plains
• The poorly drained Clamo soils, which have more clay and less sand than the Dalesburg soil; on low flood plains

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Well suited
Management concerns: Limited available water capacity, flooding
Management measures:
• This soil is better suited to early maturing crops than to other crops. Minimizing tillage and leaving crop residue on the surface conserve moisture and help to maintain tilth and the content of organic matter.
• Rotations that include grasses and legumes help to maintain tilth and the content of organic matter. Irrigation helps to overcome the limited available water capacity if water of adequate quantity and quality is available.

Interpretive Groups

Land capability classification: IIs
Range site: Loamy Overflow
Windbreak suitability group: 1
Pasture suitability group: K

DbB—Dalesburg-Dimo complex, 1 to 4 percent slopes

Composition

Dalesburg and similar soils: 50 to 60 percent
Dimo and similar soils: 25 to 35 percent
Contrasting inclusions: 5 to 25 percent

Setting

Landform: Flood plains
Position on the landform: High flood plains
Slope range: Dalesburg—1 to 4 percent; Dimo—1 to 2 percent
Shape of areas: Irregular
Size of areas: 10 to 1,000 acres

Typical Profile

Dalesburg

Surface soil:
0 to 14 inches—dark gray loam

Subsoil:
14 to 24 inches—very dark grayish brown sandy loam
24 to 34 inches—dark grayish brown sandy loam with redox concentrations

Underlying layers:
34 to 62 inches—brown and pale brown, calcareous loamy sand with redox concentrations
62 to 80 inches—brown, calcareous gravelly sand with redox concentrations

Dimo

Surface soil:
0 to 12 inches—dark gray clay loam

Subsoil:
12 to 23 inches—dark grayish brown loam with redox concentrations
23 to 30 inches—light olive brown loam with redox concentrations

Underlying layers:
30 to 35 inches—grayish brown, calcareous gravelly sandy loam with redox concentrations
35 to 80 inches—yellowish brown, calcareous gravelly sand with redox concentrations

Soil Properties and Qualities

Drainage class: Dalesburg—moderately well drained; Dimo—somewhat poorly drained
Depth to bedrock: Very deep
Depth to contrasting parent material: Dalesburg—more than 60 inches; Dimo—20 to 40 inches over outwash sand and gravel
Depth to the water table: Dalesburg—3 to 6 feet; Dimo—1.5 to 3.0 feet
Flooding: Dalesburg—occasional for brief periods; Dimo—occasional for long periods
Ponding: None
Permeability: Dalesburg—rapid; Dimo—moderate in the upper part and rapid or very rapid in the lower part
Available water capacity: Moderate
Content of organic matter: Dalesburg—moderate; Dimo—high
Surface runoff: Dalesburg—medium; Dimo—low

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Lex soils, which have free carbonates at or near the surface; in positions on the landform similar to those of the major soils
• The somewhat poorly drained Lamo soils, which have more silt and less sand than the major soils; on high flood plains
• The poorly drained Clamo and Luton soils, which have more clay and less sand than the major soils; on low flood plains

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, soybeans
Suitability for crops: Well suited
Management concerns: Dalesburg—limited available water capacity, water erosion, flooding; Dimo—limited available water capacity, wetness
Management measures:
• These soils are better suited to early maturing crops than to other crops, except in years when the water table is high or flooding occurs. Minimizing tillage and leaving crop residue on the surface conserve moisture and help to control erosion.
• Rotations that include grasses and legumes help to control erosion and maintain tilth and the content of organic matter. Irrigation helps to overcome the limited available water capacity if the quantity and quality of the water are adequate.

Interpretive Groups

Land capability classification: Dalesburg—IIe; Dimo—IIw
Range site: Dalesburg—Loamy Overflow; Dimo—Loamy Overflow
Windbreak suitability group: Dalesburg—1; Dimo—1
Pasture suitability group: Dalesburg—K; Dimo—K

DcA—Davis loam, 0 to 2 percent slopes

Composition

Davis and similar soils: 75 to 90 percent
Contrasting inclusions: 10 to 25 percent

Setting

Landform: Alluvial terraces or colluvial fans
Position on the landform: Footslopes
Slope range: 0 to 2 percent
Shape of areas: Elongated or irregular
Size of areas: 10 to 200 acres

Typical Profile

Surface soil:
0 to 15 inches—very dark gray loam

Subsoil:
15 to 33 inches—very dark grayish brown loam
33 to 41 inches—dark grayish brown loam
41 to 64 inches—light olive brown, calcareous clay loam

Underlying layer:
64 to 80 inches—light yellowish brown, calcareous clay loam

Soil Properties and Qualities

Drainage class: Moderately well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: 40 to more than 60 inches over clayey alluvium
Depth to the water table: 3 to 5 feet
Flooding: Rare
Ponding: None
Permeability: Moderate
Available water capacity: High

Content of organic matter: High
Surface runoff: Low

Inclusions

Contrasting inclusions:
- The somewhat poorly drained Lex soils on high flood plains
- The moderately well drained Bon soils, which have free carbonates at or near the surface; on high flood plains
- The poorly drained Clamo soils on low flood plains

Similar inclusions:
- Soils that have more silt and less sand

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Well suited
Management concerns: The soil is subject to rare flooding.
Management measures:
- Crop residue management conserves moisture and helps to maintain tilth and the content of organic matter.

Interpretive Groups

Land capability classification: I
Range site: Loamy Overflow
Windbreak suitability group: 1
Pasture suitability group: K

DcB—Davis loam, 2 to 6 percent slopes

Composition

Davis and similar soils: 80 to 95 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Alluvial terraces or colluvial fans
Position on the landform: Footslopes
Slope range: 2 to 6 percent
Shape of areas: Elongated or irregular
Size of areas: 10 to 200 acres

Typical Profile

Surface soil:
0 to 15 inches—very dark gray loam

Subsoil:
15 to 33 inches—very dark grayish brown loam
33 to 41 inches—dark grayish brown loam
41 to 64 inches—light olive brown, calcareous clay loam

Underlying layer:
64 to 80 inches—light yellowish brown, calcareous clay loam

Soil Properties and Qualities

Drainage class: Well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: More than 60 inches
Depth to the water table: More than 6 feet
Flooding: None
Ponding: None
Permeability: Moderate
Available water capacity: High
Content of organic matter: High
Surface runoff: Medium

Inclusions

Contrasting inclusions:
- The well drained Clarno soils on backslopes
- The moderately well drained Bon soils, which have free carbonates at or near the surface; on high flood plains
- The somewhat poorly drained Lex soils on high flood plains

Similar inclusions:
- Soils that have more silt and less sand

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Well suited
Management concerns: Water erosion
Management measures:
- Minimizing tillage and leaving crop residue on the surface conserve moisture and help to control erosion.
- Rotations that include grasses and legumes help to control erosion and maintain tilth and the content of organic matter.

Interpretive Groups

Land capability classification: IIe
Range site: Silty
Windbreak suitability group: 3
Pasture suitability group: F

DhA—Davison-Chancellor complex, 0 to 3 percent slopes

Composition

Davison and similar soils: 40 to 60 percent
Chancellor and similar soils: 30 to 50 percent

Contrasting inclusions: 10 to 20 percent

Setting

Landform: Till plains
Position on the landform: Davison—footslopes; Chancellor—lower toeslopes
Slope range: Davison—0 to 3 percent; Chancellor—0 to 2 percent
Shape of areas: Irregular
Size of areas: 20 to 100 acres

Typical Profile

Davison

Surface layer:
0 to 8 inches—dark gray, calcareous loam

Subsoil:
8 to 15 inches—grayish brown, calcareous loam
15 to 24 inches—light brownish gray, calcareous loam
24 to 47 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions in the lower part

Underlying layer:
47 to 80 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Chancellor

Surface layer:
0 to 10 inches—very dark gray silty clay loam

Subsoil:
10 to 30 inches—pale yellow silty clay with redox concentrations
30 to 41 inches—grayish brown silty clay with redox concentrations; nests of gypsum in the lower 5 inches
41 to 54 inches—light yellowish brown and light olive gray, calcareous silty clay loam with redox concentrations
54 to 69 inches—light olive gray, calcareous clay loam with redox concentrations

Underlying layer:
69 to 80 inches—light olive gray, calcareous clay loam with redox concentrations and redox depletions

Soil Properties and Qualities

Drainage class: Davison—moderately well drained; Chancellor—somewhat poorly drained
Depth to bedrock: Very deep
Depth to contrasting parent material: Davison—more than 60 inches; Chancellor—40 to more than 60 inches over loamy glacial till
Depth to the water table: Davison—2 to 4 feet; Chancellor—1 to 2 feet
Flooding: Davison—none; Chancellor—frequent for brief periods
Ponding: None
Permeability: Davison—moderately slow; Chancellor—slow
Available water capacity: High
Content of organic matter: Davison—moderate; Chancellor—high
Surface runoff: Low
Other properties: The Davison soil has a high content of lime.

Inclusions

Contrasting inclusions:
- The poorly drained Tetonka soils in basins
- The well drained Egan soils on backslopes
- The somewhat poorly drained Whitewood soils on the upper toeslopes
- The moderately well drained Trent soils, which are leached of free carbonates to a depth of more than 30 inches and have less sand than the Davison soil; in positions on the landform similar to those of the Davison soil

Similar inclusions:
- Soils that have more silt and less sand than the Davison soil

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Well suited
Management concerns: Davison—wind erosion and the high content of lime, which adversely affects the availability of plant nutrients; Chancellor—wetness
Management measures:
- In wet years these soils are better suited to late-planted crops than to other crops. Minimizing tillage, deferring tillage, and leaving crop residue on the surface maintain tilth, help to control wind erosion, and minimize surface compaction.
- Rotations that include grasses and legumes help to control erosion and maintain fertility, tilth, and the content of organic matter. Maintaining existing drainage systems helps to remove excess water.

Interpretive Groups

Land capability classification: Davison—IIs; Chancellor—IIw
Range site: Davison—Limy Subirrigated; Chancellor—Loamy Overflow
Windbreak suitability group: Davison—1K; Chancellor—2

Pasture suitability group: Davison—F; Chancellor—A

DkA—Davison-Tetonka-Egan complex, 0 to 3 percent slopes

Composition

Davison and similar soils: 35 to 45 percent
Tetonka and similar soils: 20 to 30 percent
Egan and similar soils: 15 to 25 percent
Contrasting inclusions: 10 to 25 percent

Setting

Landform: Till plains
Position on the landform: Davison—footslopes; Tetonka—basins; Egan—backslopes
Slope range: Davison—0 to 3 percent; Tetonka—0 to 1 percent; Egan—0 to 3 percent
Shape of areas: Irregular
Size of areas: 20 to 1,500 acres

Typical Profile

Davison

Surface layer:
0 to 8 inches—dark gray, calcareous loam

Subsoil:
8 to 15 inches—grayish brown, calcareous loam
15 to 24 inches—light brownish gray, calcareous loam
24 to 47 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions in the lower part

Underlying layer:
47 to 80 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Tetonka

Surface layer:
0 to 8 inches—dark gray silt loam

Subsurface layer:
8 to 12 inches—gray silt loam

Subsoil:
12 to 20 inches—gray silt loam
20 to 31 inches—gray silty clay
31 to 59 inches—gray silty clay with redox concentrations

Underlying layer:
59 to 80 inches—gray silty clay loam with redox concentrations

Egan

Surface layer:
0 to 8 inches—very dark grayish brown silty clay loam

Subsoil:
8 to 16 inches—dark grayish brown silty clay loam
16 to 26 inches—brown silty clay loam
26 to 34 inches—light yellowish brown, calcareous silty clay loam
34 to 54 inches—light yellowish brown, calcareous clay loam with redox concentrations and redox depletions in the lower 13 inches

Underlying layer:
54 to 80 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Soil Properties and Qualities

Drainage class: Davison—moderately well drained; Tetonka—poorly drained; Egan—well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: Davison—more than 60 inches; Tetonka—more than 60 inches; Egan—24 to 40 inches over loamy glacial till
Water table: Davison—at a depth of 2 to 4 feet; Tetonka—1 foot above to 1 foot below the surface; Egan—at a depth of more than 6 feet
Flooding: None
Ponding: Davison—none; Tetonka—frequent for long periods; Egan—none
Permeability: Davison—moderately slow; Tetonka—slow; Egan—moderately slow
Available water capacity: High
Content of organic matter: Davison—moderate; Tetonka—high; Egan—moderate
Surface runoff: Davison—low; Tetonka—negligible; Egan—low
Other properties: The Davison soil has a high content of lime.

Inclusions

Contrasting inclusions:
- The somewhat poorly drained Whitewood soils on toeslopes
- The very poorly drained Worthing soils, which do not have a subsurface layer of silt loam; in basins
- The somewhat poorly drained Chancellor soils on the lower toeslopes

Similar inclusions:
- Soils that have glacial till at a greater depth than the Egan soil
- Soils that have more silt and less sand than the Davison soil

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Fairly well suited

Management concerns: Davison—wind erosion and the high content of lime, which adversely affects the availability of plant nutrients; Egan—conserving moisture; Tetonka—wetness

Management measures:

• Minimizing tillage and leaving crop residue on the surface conserve moisture and help to control erosion. Rotations that include grasses and legumes help to control erosion and maintain fertility, tilth, and the content of organic matter. Stripcropping and field windbreaks help to control wind erosion.

• In most years the Tetonka soil is better suited to late-planted crops than to other crops. Leaving crop residue on the surface and deferring tillage when the Tetonka soil is wet help to maintain tilth and minimize surface compaction. Maintaining existing drainage systems helps to remove excess water.

Interpretive Groups

Land capability classification: Davison—IIs; Tetonka—IVw; Egan—I
Range site: Davison—Limy Subirrigated; Tetonka—Wet Meadow; Egan—Silty
Windbreak suitability group: Davison—1K; Tetonka—10; Egan—3
Pasture suitability group: Davison—F; Tetonka—B2; Egan—F

DmB—Delmont-Enet loams, 2 to 6 percent slopes

Composition

Delmont and similar soils: 45 to 60 percent
Enet and similar soils: 20 to 30 percent
Contrasting inclusions: 10 to 25 percent

Setting

Landform: Outwash plains
Position on the landform: Delmont—upper backslopes; Enet—backslopes and footslopes
Slope range: 2 to 6 percent
Shape of areas: Irregular
Size of areas: 10 to 500 acres

Typical Profile

Delmont

Surface layer:
0 to 6 inches—very dark grayish brown loam

Subsoil:
6 to 11 inches—very dark grayish brown loam
11 to 18 inches—brown loam

Underlying layers:
18 to 24 inches—brown, calcareous gravelly loamy sand
24 to 80 inches—brown, calcareous gravelly sand

Enet

Surface layer:
0 to 6 inches—dark grayish brown loam

Subsoil:
6 to 11 inches—dark grayish brown loam
11 to 26 inches—brown loam

Underlying layers:
26 to 60 inches—brown, calcareous gravelly loamy sand and gravelly sand
60 to 80 inches—yellowish brown and brown, calcareous gravelly sand

Soil Properties and Qualities

Drainage class: Delmont—somewhat excessively drained; Enet—well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: Delmont—14 to 20 inches over outwash sand and gravel; Enet—20 to 40 inches over outwash sand and gravel
Depth to the water table: More than 6 feet
Flooding: None
Ponding: None
Permeability: Moderate in the upper part and rapid in the lower part
Available water capacity: Delmont—low; Enet—moderate
Content of organic matter: Moderate
Surface runoff: Medium

Inclusions

Contrasting inclusions:

• The excessively drained Talmo soils on shoulder slopes

• The well drained Egan soils, which have glacial till at a depth of 24 to 40 inches; on backslopes

Similar inclusions:

• Soils that have more silt and less sand above the gravelly material

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Fairly well suited
Management concerns: Enet—limited available water capacity; Delmont—water erosion, limited available water capacity

Management measures:
• These soils are better suited to early maturing crops than to other crops. Minimizing tillage and leaving crop residue on the surface conserve moisture and help to control erosion.
• Rotations that include grasses and legumes help to control erosion and maintain tilth and the content of organic matter. Irrigation helps to overcome the limited available water capacity if the quantity and quality of the water are adequate.

Interpretive Groups

Land capability classification: Delmont—IIIe; Enet—IIe
Range site: Delmont—Shallow to Gravel; Enet—Silty
Windbreak suitability group: Delmont—6G; Enet—6G
Pasture suitability group: Delmont—D2; Enet—D1

DnD—Delmont-Talmo complex, 6 to 15 percent slopes

Composition

Delmont and similar soils: 40 to 55 percent
Talmo and similar soils: 25 to 40 percent
Contrasting inclusions: 15 to 25 percent

Setting

Landform: Outwash plains
Position on the landform: Delmont—backslopes; Talmo—shoulder slopes
Slope range: Delmont—6 to 15 percent; Talmo—9 to 15 percent
Shape of areas: Irregular
Size of areas: 10 to 250 acres

Typical Profile

Delmont

Surface layer:
0 to 6 inches—very dark grayish brown loam

Subsoil:
6 to 11 inches—very dark grayish brown loam
11 to 18 inches—brown loam

Underlying layers:
18 to 24 inches—brown, calcareous gravelly loamy sand
24 to 80 inches—brown, calcareous gravelly sand

Talmo

Surface layer:
0 to 9 inches—dark gray, calcareous gravelly loam

Underlying layers:
9 to 66 inches—brown and yellowish brown, calcareous gravelly sand and calcareous very gravelly sand
66 to 80 inches—reddish yellow, calcareous fine sand

Soil Properties and Qualities

Drainage class: Delmont—somewhat excessively drained; Talmo—excessively drained
Depth to bedrock: Very deep
Depth to contrasting parent material: Delmont—14 to 20 inches over outwash sand and gravel; Talmo—5 to 14 inches over outwash sand and gravel
Depth to the water table: More than 6 feet
Flooding: None
Ponding: None
Permeability: Delmont—moderate in the upper part and rapid in the lower part; Talmo—rapid
Available water capacity: Low
Content of organic matter: Delmont—moderate; Talmo—moderately low
Surface runoff: Delmont—medium; Talmo—low

Inclusions

Contrasting inclusions:
• The well drained Enet soils, which have gravelly material at a depth of 20 to 40 inches; on the lower backslopes and footslopes
• The well drained Ethan soils, which do not have gravelly underlying material; on shoulder slopes
• The well drained Clarno soils, which do not have gravelly underlying material; on backslopes

Use and Management

Pasture and wildlife habitat

Suitability for crops: Generally unsuited
Management concerns: Limited available water capacity, water erosion
Management measures:
• Seeding cultivated areas to adapted grasses helps to control erosion.
• Proper grazing management helps to maintain plant vigor, conserves moisture, and helps to control erosion.

Interpretive Groups

Land capability classification: Delmont—IVe; Talmo—VIIe
Range site: Delmont—Shallow to Gravel; Talmo—Very Shallow
Windbreak suitability group: Delmont—6G; Talmo—10
Pasture suitability group: Delmont—D2; Talmo—NS

Do—Dimo clay loam, 0 to 2 percent slopes

Composition

Dimo and similar soils: 80 to 95 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Flood plains
Position on the landform: High flood plains
Slope range: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 10 to 500 acres

Typical Profile

Surface soil:
0 to 12 inches—dark gray clay loam

Subsoil:
12 to 23 inches—dark grayish brown loam with redox concentrations
23 to 30 inches—light olive brown loam with redox concentrations

Underlying layer:
30 to 35 inches—grayish brown, calcareous gravelly sandy loam with redox concentrations
35 to 80 inches—yellowish brown, calcareous gravelly sand with redox concentrations

Soil Properties and Qualities

Drainage class: Somewhat poorly drained
Depth to bedrock: Very deep
Depth to contrasting parent material: 20 to 40 inches over outwash sand and gravel
Depth to the water table: 1.5 to 3.0 feet
Flooding: Occasional for long periods
Ponding: None
Permeability: Moderate in the upper part and rapid or very rapid in the lower part
Available water capacity: Moderate
Content of organic matter: High
Surface runoff: Low

Inclusions

Contrasting inclusions:
• The moderately well drained Dalesburg soils in the slightly higher positions on the landform
• The somewhat poorly drained Lex soils, which have free carbonates at or near the surface; in positions on the landform similar to those of the Dimo soil

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Well suited
Management concerns: Limited available water capacity, wetness
Management measures:
• In wet years or after a flood event, this soil is better suited to late-planted crops than to other crops. Leaving crop residue on the surface and deferring tillage when the soil is wet help to maintain tilth and minimize surface compaction.
• In dry years this soil is better suited to early maturing crops than to other crops. Minimizing tillage and leaving crop residue on the surface conserve moisture.

Interpretive Groups

Land capability classification: IIw
Range site: Loamy Overflow
Windbreak suitability group: 1
Pasture suitability group: K

EaA—Egan-Chancellor-Davison complex, 0 to 3 percent slopes

Composition

Egan and similar soils: 30 to 45 percent
Chancellor and similar soils: 20 to 30 percent
Davison and similar soils: 15 to 25 percent
Contrasting inclusions: 10 to 20 percent

Setting

Landform: Till plains
Position on the landform: Egan—backslopes; Chancellor—lower toeslopes; Davison—footslopes
Slope range: Egan—0 to 3 percent; Chancellor—0 to 2 percent; Davison—0 to 3 percent
Shape of areas: Irregular
Size of areas: 30 to 1,500 acres

Typical Profile

Egan

Surface layer:
0 to 8 inches—very dark grayish brown silty clay loam

Subsoil:
8 to 16 inches—dark grayish brown silty clay loam
16 to 26 inches—brown silty clay loam

26 to 34 inches—light yellowish brown, calcareous silty clay loam
34 to 54 inches—light yellowish brown, calcareous clay loam with redox concentrations and redox depletions in the lower 13 inches

Underlying layer:
54 to 80 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Chancellor

Surface layer:
0 to 10 inches—very dark gray silty clay loam

Subsoil:
10 to 30 inches—pale yellow silty clay with redox concentrations
30 to 41 inches—grayish brown silty clay with redox concentrations; nests of gypsum in the lower 5 inches
41 to 54 inches—light yellowish brown and light olive gray, calcareous silty clay loam with redox concentrations
54 to 69 inches—light olive gray, calcareous clay loam with redox concentrations

Underlying layer:
69 to 80 inches—light olive gray, calcareous clay loam with redox concentrations and redox depletions

Davison

Surface layer:
0 to 8 inches—dark gray, calcareous loam

Subsoil:
8 to 15 inches—grayish brown, calcareous loam
15 to 24 inches—light brownish gray, calcareous loam
24 to 47 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions in the lower part

Underlying layer:
47 to 80 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Soil Properties and Qualities

Drainage class: Egan—well drained; Chancellor—somewhat poorly drained; Davison—moderately well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: Egan—24 to 40 inches over loamy glacial till; Chancellor—40 to more than 60 inches over loamy glacial till; Davison—more than 60 inches
Depth to the water table: Egan—more than 6 feet; Chancellor—1 to 2 feet; Davison—2 to 4 feet
Flooding: Egan—none; Chancellor—frequent for brief periods; Davison—none
Ponding: None
Permeability: Egan—moderately slow; Chancellor—slow; Davison—moderately slow
Available water capacity: High
Content of organic matter: Egan—moderate; Chancellor—high; Davison—moderate
Surface runoff: Low
Other properties: The Davison soil has a high content of lime.

Inclusions

Contrasting inclusions:
- The poorly drained Tetonka soils in basins
- The well drained Clarno soils on the upper backslopes
- The moderately well drained Trent soils, which are leached of free carbonates to a depth of more than 30 inches and have less sand than the Davison soil; in positions on the landform similar to those of the Davison soil
- The well drained Enet soils, which have gravelly material at a depth of 20 to 40 inches; on backslopes

Similar inclusions:
- Soils that have glacial till at a greater depth than the Egan soil
- Soils that have more silt and less sand than the Davison soil

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans (fig. 10)
Suitability for crops: Well suited
Management concerns: Egan—conserving moisture; Chancellor—wetness; Davison—wind erosion and the high content of lime, which adversely affects the availability of plant nutrients
Management measures:
- Minimizing tillage and leaving crop residue on the surface conserve moisture and help to control erosion. Rotations that include grasses and legumes help to control erosion and maintain fertility, tilth, and the content of organic matter.
- In wet years the Chancellor soil is better suited to late-planted crops than to other crops. Leaving crop residue on the surface and deferring tillage when the soil is wet help to maintain tilth and minimize surface compaction in areas of the Chancellor soil. Maintaining existing drainage systems helps to remove excess water.

Interpretive Groups

Land capability classification: Egan—I; Chancellor—IIw; Davison—IIs
Range site: Egan—Silty; Chancellor—Loamy Overflow; Davison—Limy Subirrigated
Windbreak suitability group: Egan—3; Chancellor—2; Davison—1K
Pasture suitability group: Egan—F; Chancellor—A; Davison—F

EbA—Egan-Clarno-Chancellor complex, 0 to 3 percent slopes

Composition

Egan and similar soils: 35 to 50 percent
Clarno and similar soils: 20 to 30 percent
Chancellor and similar soils: 15 to 25 percent
Contrasting inclusions: 10 to 20 percent

Setting

Landform: Till plains
Position on the landform: Egan—backslopes; Clarno—upper backslopes; Chancellor—lower toeslopes
Slope range: Egan—0 to 3 percent; Clarno—1 to 3 percent; Chancellor—0 to 2 percent
Shape of areas: Irregular
Size of areas: 25 to 750 acres

Typical Profile

Egan

Surface layer:
0 to 8 inches—very dark grayish brown silty clay loam

Subsoil:
8 to 16 inches—dark grayish brown silty clay loam
16 to 26 inches—brown silty clay loam
26 to 34 inches—light yellowish brown, calcareous silty clay loam
34 to 54 inches—light yellowish brown, calcareous clay loam with redox concentrations and redox depletions in the lower 13 inches

Underlying layer:
54 to 80 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Clarno

Surface layer:
0 to 7 inches—dark grayish brown loam

Subsoil:
7 to 16 inches—brown loam
16 to 44 inches—light yellowish brown, calcareous clay loam with redox concentrations and redox depletions in the lower part
44 to 53 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Underlying layer:
53 to 80 inches—pale yellow, calcareous clay loam with redox concentrations

Chancellor

Surface layer:
0 to 10 inches—very dark gray silty clay loam

Subsoil:
10 to 30 inches—pale yellow silty clay with redox concentrations
30 to 41 inches—grayish brown silty clay with redox concentrations; nests of gypsum in the lower 5 inches
41 to 54 inches—light yellowish brown and light olive gray, calcareous silty clay loam with redox concentrations
54 to 69 inches—light olive gray, calcareous clay loam with redox concentrations

Underlying layer:
69 to 80 inches—light olive gray, calcareous clay loam with redox concentrations and redox depletions

Soil Properties and Qualities

Drainage class: Egan—well drained; Clarno—well drained; Chancellor—somewhat poorly drained
Depth to bedrock: Very deep
Depth to contrasting parent material: Egan—24 to 40 inches over loamy glacial till; Clarno—more than 60 inches; Chancellor—40 to more than 60 inches over loamy glacial till
Depth to the water table: Egan—more than 6 feet; Clarno—more than 6 feet; Chancellor—1 to 2 feet
Flooding: Egan—none; Clarno—none; Chancellor—frequent for brief periods
Ponding: None
Permeability: Egan—moderately slow; Clarno—moderately slow; Chancellor—slow
Available water capacity: High
Content of organic matter: Egan—moderate; Clarno—moderate; Chancellor—high
Surface runoff: Low

Inclusions

Contrasting inclusions:
• The poorly drained Tetonka soils in basins
• The moderately well drained Davison soils, which have free carbonates at or near the surface; on footslopes

• The moderately well drained Trent soils on footslopes
• The well drained Enet soils, which have gravelly material at a depth of 20 to 40 inches; on backslopes

Similar inclusions:
• Soils that have glacial till at a greater depth than the Egan soil

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Well suited
Management concerns: Egan and Clarno—conserving moisture; Chancellor—wetness
Management measures:
• Crop residue management conserves moisture and helps to maintain tilth and the content of organic matter.
• In wet years the Chancellor soil is better suited to late-planted crops than to other crops. Leaving crop residue on the surface and deferring tillage when the soil is wet help to maintain tilth and minimize surface compaction in areas of the Chancellor soil. Maintaining existing drainage systems helps to remove excess water.

Interpretive Groups

Land capability classification: Egan—I; Clarno—I; Chancellor—IIw
Range site: Egan—Silty; Clarno—Silty; Chancellor—Loamy Overflow
Windbreak suitability group: Egan—3; Clarno—3; Chancellor—2
Pasture suitability group: Egan—F; Clarno—F; Chancellor—A

EcA—Egan-Clarno-Tetonka complex, 0 to 2 percent slopes

Composition

Egan and similar soils: 30 to 50 percent
Clarno and similar soils: 15 to 30 percent
Tetonka and similar soils: 15 to 25 percent
Contrasting inclusions: 15 to 20 percent

Setting

Landform: Till plains
Position on the landform: Egan—backslopes; Clarno—upper backslopes; Tetonka—basins
Slope range: Egan—0 to 2 percent; Clarno—0 to 2 percent; Tetonka—0 to 1 percent
Shape of areas: Irregular
Size of areas: 30 to 1,500 acres

Typical Profile

Egan

Surface layer:
0 to 8 inches—very dark grayish brown silty clay loam

Subsoil:
8 to 16 inches—dark grayish brown silty clay loam
16 to 26 inches—brown silty clay loam
26 to 34 inches—light yellowish brown, calcareous silty clay loam
34 to 54 inches—light yellowish brown, calcareous clay loam with redox concentrations and redox depletions in the lower 13 inches

Underlying layer:
54 to 80 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Clarno

Surface layer:
0 to 7 inches—dark grayish brown loam

Subsoil:
7 to 16 inches—brown loam
16 to 44 inches—light yellowish brown, calcareous clay loam with redox concentrations and redox depletions in the lower part
44 to 53 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Underlying layer:
53 to 80 inches—pale yellow, calcareous clay loam with redox concentrations

Tetonka

Surface layer:
0 to 8 inches—dark gray silt loam

Subsurface layer:
8 to 12 inches—gray silt loam

Subsoil:
12 to 20 inches—gray silt loam
20 to 31 inches—gray silty clay
31 to 59 inches—gray silty clay with redox concentrations

Underlying layer:
59 to 80 inches—gray silty clay loam with redox concentrations

Soil Properties and Qualities

Drainage class: Egan—well drained; Clarno—well drained; Tetonka—poorly drained
Depth to bedrock: Very deep

Depth to contrasting parent material: Egan—24 to 40 inches over loamy glacial till; Clarno—more than 60 inches; Tetonka—more than 60 inches
Water table: Egan—at a depth of more than 6 feet; Clarno—at a depth of more than 6 feet; Tetonka—1 foot above to 1 foot below the surface
Flooding: None
Ponding: Egan—none; Clarno—none; Tetonka—frequent for long periods
Permeability: Egan—moderately slow; Clarno—moderately slow; Tetonka—slow
Available water capacity: High
Content of organic matter: Egan—moderate; Clarno—moderate; Tetonka—high
Surface runoff: Egan—low; Clarno—low; Tetonka—negligible

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Chancellor soils on the lower toeslopes
• The moderately well drained Trent and Davison soils on footslopes
• The somewhat poorly drained Whitewood soils on toeslopes

Similar inclusions:
• Soils that have glacial till at a greater depth than the Egan soil

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Fairly well suited
Management concerns: Egan and Clarno—conserving moisture; Tetonka—wetness
Management measures:
• Crop residue management conserves moisture and helps to maintain tilth and the content of organic matter.
• In most years the Tetonka soil is better suited to late-planted crops than to other crops. Leaving crop residue on the surface and deferring tillage when the Tetonka soil is wet help to maintain tilth and minimize surface compaction. Maintaining existing drainage systems helps to remove excess water.

Interpretive Groups

Land capability classification: Egan—I; Clarno—I; Tetonka—IVw
Range site: Egan—Silty; Clarno—Silty; Tetonka—Wet Meadow
Windbreak suitability group: Egan—3; Clarno—3; Tetonka—10
Pasture suitability group: Egan—F; Clarno—F; Tetonka—B2

EdA—Egan-Clarno-Trent complex, 0 to 2 percent slopes

Composition

Egan and similar soils: 40 to 60 percent
Clarno and similar soils: 20 to 30 percent
Trent and similar soils: 15 to 25 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Till plains
Position on the landform: Egan—backslopes; Clarno—upper backslopes; Trent—footslopes
Slope range: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 25 to 600 acres

Typical Profile

Egan

Surface layer:
0 to 8 inches—very dark grayish brown silty clay loam

Subsoil:
8 to 16 inches—dark grayish brown silty clay loam
16 to 26 inches—brown silty clay loam
26 to 34 inches—light yellowish brown, calcareous silty clay loam
34 to 54 inches—light yellowish brown, calcareous clay loam with redox concentrations and redox depletions in the lower 13 inches

Underlying layer:
54 to 80 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Clarno

Surface layer:
0 to 7 inches—dark grayish brown loam

Subsoil:
7 to 16 inches—brown loam
16 to 44 inches—light yellowish brown, calcareous clay loam with redox concentrations and redox depletions in the lower part
44 to 53 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Underlying layer:
53 to 80 inches—pale yellow, calcareous clay loam with redox concentrations

Trent

Surface soil:
0 to 17 inches—very dark gray silty clay loam

Subsoil:
17 to 28 inches—very dark grayish brown silty clay loam
28 to 47 inches—grayish brown silty clay loam
47 to 52 inches—light brownish gray, calcareous silty clay loam with redox concentrations and redox depletions
52 to 64 inches—pale yellow, calcareous silty clay loam with redox concentrations and redox depletions

Underlying layers:
64 to 71 inches—light yellowish brown, calcareous silty clay loam with redox concentrations and redox depletions
71 to 80 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Soil Properties and Qualities

Drainage class: Egan—well drained; Clarno—well drained; Trent—moderately well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: Egan—24 to 40 inches over loamy glacial till; Clarno—more than 60 inches; Trent—40 to more than 60 inches over loamy glacial till
Depth to the water table: Egan—more than 6 feet; Clarno—more than 6 feet; Trent—3.5 to 5.0 feet
Flooding: None
Ponding: None
Permeability: Egan—moderately slow; Clarno—moderately slow; Trent—moderate
Available water capacity: High
Content of organic matter: Egan—moderate; Clarno—moderate; Trent—high
Surface runoff: Low
Other features: Runoff water flows over areas of the Trent soil during periods of rainfall or snowmelt.

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Chancellor soils on the lower toeslopes
• The poorly drained Tetonka soils in basins
• The moderately well drained Davison soils, which have free carbonates at or near the surface; on footslopes
• The well drained Ethan soils, which have free carbonates at or near the surface; on shoulder slopes

Similar inclusions:
• Soils that have glacial till at a greater depth than the Egan soil

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Well suited
Management concerns: Egan and Clarno—conserving moisture; Trent—excess moisture during wet years
Management measures:
• Crop residue management conserves moisture and helps to maintain tilth and the content of organic matter.

Interpretive Groups

Land capability classification: Egan—I; Clarno—I; Trent—I
Range site: Egan—Silty; Clarno—Silty; Trent—Loamy Overflow
Windbreak suitability group: Egan—3; Clarno—3; Trent—1
Pasture suitability group: Egan—F; Clarno—F; Trent—K

EdB—Egan-Clarno-Trent complex, 1 to 6 percent slopes

Composition

Egan and similar soils: 40 to 55 percent
Clarno and similar soils: 20 to 35 percent
Trent and similar soils: 15 to 25 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Till plains
Position on the landform: Egan—backslopes; Clarno—upper backslopes; Trent—footslopes
Slope range: Egan—2 to 6 percent; Clarno—2 to 6 percent; Trent—1 to 2 percent
Shape of areas: Irregular
Size of areas: 10 to 500 acres

Typical Profile

Egan

Surface layer:
0 to 8 inches—very dark grayish brown silty clay loam

Subsoil:
8 to 16 inches—dark grayish brown silty clay loam
16 to 26 inches—brown silty clay loam
26 to 34 inches—light yellowish brown, calcareous silty clay loam
34 to 54 inches—light yellowish brown, calcareous clay loam with redox concentrations and redox depletions in the lower 13 inches

Underlying layer:
54 to 80 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Clarno

Surface layer:
0 to 7 inches—dark grayish brown loam

Subsoil:
7 to 16 inches—brown loam
16 to 44 inches—light yellowish brown, calcareous clay loam with redox concentrations and redox depletions in the lower part
44 to 53 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Underlying layer:
53 to 80 inches—pale yellow, calcareous clay loam with redox concentrations

Trent

Surface soil:
0 to 17 inches—very dark gray silty clay loam

Subsoil:
17 to 28 inches—very dark grayish brown silty clay loam
28 to 47 inches—grayish brown silty clay loam
47 to 52 inches—light brownish gray, calcareous silty clay loam with redox concentrations and redox depletions
52 to 64 inches—pale yellow, calcareous silty clay loam with redox concentrations and redox depletions

Underlying layers:
64 to 71 inches—light yellowish brown, calcareous silty clay loam with redox concentrations and redox depletions
71 to 80 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Soil Properties and Qualities

Drainage class: Egan—well drained; Clarno—well drained; Trent—moderately well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: Egan—24 to 40 inches over loamy glacial till; Clarno—more than 60 inches; Trent—40 to more than 60 inches over loamy glacial till
Depth to the water table: Egan—more than 6 feet; Clarno—more than 6 feet; Trent—3.5 to 5.0 feet
Flooding: None
Ponding: None
Permeability: Egan—moderately slow; Clarno—moderately slow; Trent—moderate
Available water capacity: High
Content of organic matter: Egan—moderate; Clarno—moderate; Trent—high
Surface runoff: Egan—medium; Clarno—medium; Trent—low
Other features: Runoff water flows over areas of the Trent soil during periods of rainfall or snowmelt.

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Chancellor soils on the lower toeslopes
• The moderately well drained Davison soils, which have free carbonates at or near the surface; on footslopes
• The well drained Ethan soils, which have free carbonates at or near the surface; on shoulder slopes

Similar inclusions:
• Soils that have glacial till at a greater depth than the Egan soil

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Well suited
Management concerns: Egan and Clarno—water erosion; Trent—excess moisture during wet years
Management measures:
• Minimizing tillage and leaving crop residue on the surface conserve moisture and help to control erosion.
• Rotations that include grasses and legumes help to control erosion and maintain tilth and the content of organic matter.

Interpretive Groups

Land capability classification: Egan—IIe; Clarno—IIe; Trent—I
Range site: Egan—Silty; Clarno—Silty; Trent—Loamy Overflow
Windbreak suitability group: Egan—3; Clarno—3; Trent—1
Pasture suitability group: Egan—F; Clarno—F; Trent—K

EeB—Egan-Ethan complex, 2 to 6 percent slopes

Composition

Egan and similar soils: 40 to 50 percent
Ethan and similar soils: 20 to 40 percent
Contrasting inclusions: 10 to 20 percent

Setting

Landform: Till plains
Position on the landform: Egan—backslopes; Ethan—shoulder slopes
Slope range: 2 to 6 percent
Shape of areas: Irregular
Size of areas: 20 to 100 acres

Typical Profile

Egan

Surface layer:
0 to 8 inches—very dark grayish brown silty clay loam

Subsoil:
8 to 16 inches—dark grayish brown silty clay loam
16 to 26 inches—brown silty clay loam
26 to 34 inches—light yellowish brown, calcareous silty clay loam
34 to 54 inches—light yellowish brown, calcareous clay loam with redox concentrations and redox depletions in the lower 13 inches

Underlying layer:
54 to 80 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Ethan

Surface layer:
0 to 8 inches—dark grayish brown, calcareous loam

Subsoil:
8 to 22 inches—light yellowish brown, calcareous clay loam
22 to 51 inches—pale yellow, calcareous clay loam with redox concentrations

Underlying layer:
51 to 80 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Soil Properties and Qualities

Drainage class: Well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: Egan—24 to 40 inches over loamy glacial till; Ethan—more than 60 inches
Depth to the water table: More than 6 feet
Flooding: None
Ponding: None
Permeability: Moderately slow
Available water capacity: High
Content of organic matter: Egan—moderate; Ethan—moderately low
Surface runoff: Medium
Other properties: The Ethan soil has a high content of lime.

Inclusions

Contrasting inclusions:
• The moderately well drained Trent soils on footslopes
• The somewhat poorly drained Chancellor soils on the lower toeslopes
• The moderately well drained Davison soils on footslopes
• The well drained Clarno soils on the upper backslopes

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Well suited
Management concerns: Egan—water erosion; Ethan—wind erosion, water erosion, and the high content of lime, which adversely affects the availability of plant nutrients
Management measures:
• Minimizing tillage and leaving crop residue on the surface conserve moisture and help to control erosion. Rotations that include grasses and legumes help to control erosion and maintain fertility, tilth, and the content of organic matter.
• Applying animal wastes, especially on the Ethan soil, helps to maintain fertility and the content of organic matter.

Interpretive Groups

Land capability classification: Egan—IIe; Ethan—IIIe
Range site: Egan—Silty; Ethan—Thin Upland
Windbreak suitability group: Egan—3; Ethan—8
Pasture suitability group: Egan—F; Ethan—G

EfB—Egan-Ethan-Tetonka complex, 0 to 6 percent slopes

Composition

Egan and similar soils: 30 to 50 percent
Ethan and similar soils: 20 to 30 percent
Tetonka and similar soils: 15 to 25 percent
Contrasting inclusions: 15 to 20 percent

Setting

Landform: Till plains
Position on the landform: Egan—backslopes; Ethan—shoulder slopes; Tetonka—basins
Slope range: Egan—0 to 6 percent; Ethan—2 to 6 percent; Tetonka—0 to 1 percent
Shape of areas: Irregular
Size of areas: 20 to 500 acres

Typical Profile

Egan

Surface layer:
0 to 8 inches—very dark grayish brown silty clay loam

Subsoil:
8 to 16 inches—dark grayish brown silty clay loam
16 to 26 inches—brown silty clay loam
26 to 34 inches—light yellowish brown, calcareous silty clay loam
34 to 54 inches—light yellowish brown, calcareous clay loam with redox concentrations and redox depletions in the lower 13 inches

Underlying layer:
54 to 80 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Ethan

Surface layer:
0 to 8 inches—dark grayish brown, calcareous loam

Subsoil:
8 to 22 inches—light yellowish brown, calcareous clay loam
22 to 51 inches—pale yellow, calcareous clay loam with redox concentrations

Underlying layer:
51 to 80 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Tetonka

Surface layer:
0 to 8 inches—dark gray silt loam

Subsurface layer:
8 to 12 inches—gray silt loam

Subsoil:
12 to 20 inches—gray silt loam
20 to 31 inches—gray silty clay
31 to 59 inches—gray silty clay with redox concentrations

Underlying layer:
59 to 80 inches—gray silty clay loam with redox concentrations

Soil Properties and Qualities

Drainage class: Egan—well drained; Ethan—well drained; Tetonka—poorly drained
Depth to bedrock: Very deep
Depth to contrasting parent material: Egan—24 to 40 inches over loamy glacial till; Ethan—more than 60 inches; Tetonka—more than 60 inches
Water table: Egan—at a depth of more than 6 feet; Ethan—at a depth of more than 6 feet; Tetonka—1 foot above to 1 foot below the surface
Flooding: None
Ponding: Egan—none; Ethan—none; Tetonka—frequent for long periods
Permeability: Egan—moderately slow; Ethan—moderately slow; Tetonka—slow
Available water capacity: High
Content of organic matter: Egan—moderate; Ethan—moderately low; Tetonka—high
Surface runoff: Egan—medium; Ethan—medium; Tetonka—negligible
Other properties: The Ethan soil has a high content of lime.

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Chancellor soils on the lower toeslopes
• The moderately well drained Davison soils on footslopes
• The well drained Clarno soils on the upper backslopes
• The moderately well drained Trent soils on footslopes

Similar inclusions:
• Soils that have glacial till at a greater depth than the Egan soil

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Fairly well suited
Management concerns: Egan—water erosion; Ethan—wind erosion, water erosion, and the high content of lime, which adversely affects the availability of plant nutrients; Tetonka—wetness
Management measures:
• Minimizing tillage and leaving crop residue on the surface conserve moisture and help to control erosion.
• Rotations that include grasses and legumes help to control erosion and maintain fertility, tilth, and the content of organic matter.
• Applying animal wastes, especially on the Ethan

soil, helps to maintain fertility and the content of organic matter.

- In most years the Tetonka soil is better suited to late-planted crops than to other crops. Leaving crop residue on the surface and deferring tillage when the Tetonka soil is wet help to maintain tilth and minimize surface compaction. Maintaining existing drainage systems helps to remove excess water.

Interpretive Groups

Land capability classification: Egan—IIe; Ethan—IIIe; Tetonka—IVw
Range site: Egan—Silty; Ethan—Thin Upland; Tetonka—Wet Meadow
Windbreak suitability group: Egan—3; Ethan—8; Tetonka—10
Pasture suitability group: Egan—F; Ethan—G; Tetonka—B2

EgB—Egan-Ethan-Trent complex, 1 to 6 percent slopes

Composition

Egan and similar soils: 40 to 50 percent
Ethan and similar soils: 20 to 30 percent
Trent and similar soils: 15 to 25 percent
Contrasting inclusions: 10 to 20 percent

Setting

Landform: Till plains
Position on the landform: Egan—backslopes; Ethan—shoulder slopes; Trent—footslopes
Slope range: Egan—1 to 6 percent; Ethan—2 to 6 percent; Trent—1 to 2 percent
Shape of areas: Irregular
Size of areas: 10 to 500 acres

Typical Profile

Egan

Surface layer:
0 to 8 inches—very dark grayish brown silty clay loam

Subsoil:
8 to 16 inches—dark grayish brown silty clay loam
16 to 26 inches—brown silty clay loam
26 to 34 inches—light yellowish brown, calcareous silty clay loam
34 to 54 inches—light yellowish brown, calcareous clay loam with redox concentrations and redox depletions in the lower 13 inches

Underlying layer:
54 to 80 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Ethan

Surface layer:
0 to 8 inches—dark grayish brown, calcareous loam

Subsoil:
8 to 22 inches—light yellowish brown, calcareous clay loam
22 to 51 inches—pale yellow, calcareous clay loam with redox concentrations

Underlying layer:
51 to 80 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Trent

Surface soil:
0 to 17 inches—very dark gray silty clay loam

Subsoil:
17 to 28 inches—very dark grayish brown silty clay loam
28 to 47 inches—grayish brown silty clay loam
47 to 52 inches—light brownish gray, calcareous silty clay loam with redox concentrations and redox depletions
52 to 64 inches—pale yellow, calcareous silty clay loam with redox concentrations and redox depletions

Underlying layers:
64 to 71 inches—light yellowish brown, calcareous silty clay loam with redox concentrations and redox depletions
71 to 80 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Soil Properties and Qualities

Drainage class: Egan—well drained; Ethan—well drained; Trent—moderately well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: Egan—24 to 40 inches over loamy glacial till; Ethan—more than 60 inches; Trent—40 to more than 60 inches over loamy glacial till
Depth to the water table: Egan—more than 6 feet; Ethan—more than 6 feet; Trent—3.5 to 5.0 feet
Flooding: None
Ponding: None
Permeability: Egan—moderately slow; Ethan—moderately slow; Trent—moderate
Available water capacity: High
Content of organic matter: Egan—moderate; Ethan—moderately low; Trent—high
Surface runoff: Egan—medium; Ethan—medium; Trent—low
Other features: The Ethan soil has a high content of

lime. Runoff water flows over areas of the Trent soil during periods of rainfall or snowmelt.

Inclusions

Contrasting inclusions:
- The somewhat poorly drained Chancellor soils on the lower toeslopes
- The poorly drained Tetonka soils in basins
- The moderately well drained Davison soils, which have free carbonates at or near the surface and have more sand than the Trent soil; in positions on the landform similar to those of the Trent soil
- The well drained Enet soils, which have gravelly material at a depth of 20 to 40 inches; on backslopes

Similar inclusions:
- Soils that have glacial till at a greater depth than the Egan soil

Use and Management

Cropland

Main crops: Alfalfa, corn (fig. 11), oats, and soybeans
Suitability for crops: Well suited
Management concerns: Egan—water erosion; Ethan—wind erosion, water erosion, and the high content of lime, which adversely affects the availability of plant nutrients; Trent—excess moisture during wet years
Management measures:
- Minimizing tillage and leaving crop residue on the surface conserve moisture and help to control erosion.
- Rotations that include grasses and legumes help to control erosion and maintain fertility, tilth, and the content of organic matter.
- Applying animal wastes, especially on the Ethan soil, helps to maintain fertility and the content of organic matter.

Interpretive Groups

Land capability classification: Egan—IIe; Ethan—IIIe; Trent—I
Range site: Egan—Silty; Ethan—Thin Upland; Trent—Loamy Overflow
Windbreak suitability group: Egan—3; Ethan—8; Trent—1
Pasture suitability group: Egan—F; Ethan—G; Trent—K

EhA—Egan-Trent silty clay loams, 0 to 2 percent slopes

Composition

Egan and similar soils: 40 to 60 percent
Trent and similar soils: 25 to 40 percent
Contrasting inclusions: 10 to 20 percent

Setting

Landform: Till plains
Position on the landform: Egan—backslopes and summits; Trent—footslopes (fig. 12)
Slope range: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 20 to 600 acres

Typical Profile

Egan

Surface layer:
0 to 8 inches—very dark grayish brown silty clay loam

Subsoil:
8 to 16 inches—dark grayish brown silty clay loam
16 to 26 inches—brown silty clay loam
26 to 34 inches—light yellowish brown, calcareous silty clay loam
34 to 54 inches—light yellowish brown, calcareous clay loam with redox concentrations and redox depletions in the lower 13 inches

Underlying layer:
54 to 80 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Trent

Surface soil:
0 to 17 inches—very dark gray silty clay loam

Subsoil:
17 to 28 inches—very dark grayish brown silty clay loam
28 to 47 inches—grayish brown silty clay loam
47 to 52 inches—light brownish gray, calcareous silty clay loam with redox concentrations and redox depletions
52 to 64 inches—pale yellow, calcareous silty clay loam with redox concentrations and redox depletions

Underlying layers:
64 to 71 inches—light yellowish brown, calcareous silty clay loam with redox concentrations and redox depletions
71 to 80 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Soil Properties and Qualities

Drainage class: Egan—well drained; Trent—moderately well drained
Depth to bedrock: Very deep

Depth to contrasting parent material: Egan—24 to 40 inches over loamy glacial till; Trent—40 to more than 60 inches over loamy glacial till
Depth to the water table: Egan—more than 6 feet; Trent—3.5 to 5.0 feet
Flooding: None
Ponding: None
Permeability: Egan—moderately slow; Trent—moderate
Available water capacity: High
Content of organic matter: Egan—moderate; Trent—high
Surface runoff: Low
Other features: Runoff water flows over areas of the Trent soil during periods of rainfall or snowmelt.

Inclusions

Contrasting inclusions:
- The well drained Clarno soils on shoulder slopes
- The somewhat poorly drained Chancellor soils on the lower toeslopes
- The somewhat poorly drained Whitewood soils on toeslopes
- The moderately well drained Davison soils, which have free carbonates at or near the surface; on footslopes

Similar inclusions:
- Soils that have glacial till at a greater depth than the Egan soil

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Well suited
Management concerns: Egan—conserving moisture; Trent—excess moisture during wet years
Management measures:
- Crop residue management conserves moisture and helps to maintain tilth and the content of organic matter.

Interpretive Groups

Land capability classification: Egan—I; Trent—I
Range site: Egan—Silty; Trent—Loamy Overflow
Windbreak suitability group: Egan—3; Trent—1
Pasture suitability group: Egan—F; Trent—K

EhB—Egan-Trent silty clay loams, 1 to 6 percent slopes

Composition

Egan and similar soils: 40 to 60 percent
Trent and similar soils: 20 to 40 percent
Contrasting inclusions: 10 to 20 percent

Setting

Landform: Till plains
Position on the landform: Egan—backslopes; Trent—footslopes
Slope range: Egan—2 to 6 percent; Trent—1 to 2 percent
Shape of areas: Irregular
Size of areas: 20 to 250 acres

Typical Profile

Egan

Surface layer:
0 to 8 inches—very dark grayish brown silty clay loam

Subsoil:
8 to 16 inches—dark grayish brown silty clay loam
16 to 26 inches—brown silty clay loam
26 to 34 inches—light yellowish brown, calcareous silty clay loam
34 to 54 inches—light yellowish brown, calcareous clay loam with redox concentrations and redox depletions in the lower 13 inches

Underlying layer:
54 to 80 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Trent

Surface soil:
0 to 17 inches—very dark gray silty clay loam

Subsoil:
17 to 28 inches—very dark grayish brown silty clay loam
28 to 47 inches—grayish brown silty clay loam
47 to 52 inches—light brownish gray, calcareous silty clay loam with redox concentrations and redox depletions
52 to 64 inches—pale yellow, calcareous silty clay loam with redox concentrations and redox depletions

Underlying layers:
64 to 71 inches—light yellowish brown, calcareous silty clay loam with redox concentrations and redox depletions
71 to 80 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Soil Properties and Qualities

Drainage class: Egan—well drained; Trent—moderately well drained

Depth to bedrock: Very deep
Depth to contrasting parent material: Egan—24 to 40 inches over loamy glacial till; Trent—40 to more than 60 inches over loamy glacial till
Depth to the water table: Egan—more than 6 feet; Trent—3.5 to 5.0 feet
Flooding: None
Ponding: None
Permeability: Egan—moderately slow; Trent—moderate
Available water capacity: High
Content of organic matter: Egan—moderate; Trent—high
Surface runoff: Egan—medium; Trent—low
Other features: Runoff water flows over areas of the Trent soil during periods of rainfall or snowmelt.

Inclusions

Contrasting inclusions:
- The well drained Clarno soils on shoulder slopes
- The somewhat poorly drained Chancellor soils on the lower toeslopes
- The moderately well drained Davison soils, which have free carbonates at or near the surface; on footslopes

Similar inclusions:
- Soils that have glacial till at a greater depth than the Egan soil

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Well suited
Management concerns: Egan—water erosion; Trent—excess moisture during wet years
Management measures:
- Minimizing tillage and leaving crop residue on the surface conserve moisture and help to control erosion.
- Contour farming and grassed waterways help to control water erosion, but slopes in most areas are too short or irregular to be farmed on the contour.
- Rotations that include grasses and legumes help to control erosion and maintain fertility, tilth, and the content of organic matter.

Interpretive Groups

Land capability classification: Egan—IIe; Trent—I
Range site: Egan—Silty; Trent—Loamy Overflow
Windbreak suitability group: Egan—3; Trent—1
Pasture suitability group: Egan—F; Trent—K

Ek—Egan-Trent-Chancellor silty clay loams, 0 to 2 percent slopes

Composition

Egan and similar soils: 35 to 50 percent
Trent and similar soils: 20 to 35 percent
Chancellor and similar soils: 15 to 25 percent
Contrasting inclusions: 10 to 25 percent

Setting

Landform: Till plains
Position on the landform: Egan—backslopes and summits; Trent—footslopes; Chancellor—lower toeslopes
Slope range: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 25 to 500 acres

Typical Profile

Egan

Surface layer:
0 to 8 inches—very dark grayish brown silty clay loam

Subsoil:
8 to 16 inches—dark grayish brown silty clay loam
16 to 26 inches—brown silty clay loam
26 to 34 inches—light yellowish brown, calcareous silty clay loam
34 to 54 inches—light yellowish brown, calcareous clay loam with redox concentrations and redox depletions in the lower 13 inches

Underlying layer:
54 to 80 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Trent

Surface soil:
0 to 17 inches—very dark gray silty clay loam

Subsoil:
17 to 28 inches—very dark grayish brown silty clay loam
28 to 47 inches—grayish brown silty clay loam
47 to 52 inches—light brownish gray, calcareous silty clay loam with redox concentrations and redox depletions
52 to 64 inches—pale yellow, calcareous silty clay loam with redox concentrations and redox depletions

Underlying layers:
64 to 71 inches—light yellowish brown, calcareous silty clay loam with redox concentrations and redox depletions

71 to 80 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Chancellor

Surface layer:
0 to 10 inches—very dark gray silty clay loam

Subsoil:
10 to 30 inches—pale yellow silty clay with redox concentrations
30 to 41 inches—grayish brown silty clay with redox concentrations; nests of gypsum in the lower 5 inches
41 to 54 inches—light yellowish brown and light olive gray, calcareous silty clay loam with redox concentrations
54 to 69 inches—light olive gray, calcareous clay loam with redox concentrations

Underlying layer:
69 to 80 inches—light olive gray, calcareous clay loam with redox concentrations and redox depletions

Soil Properties and Qualities

Drainage class: Egan—well drained; Trent—moderately well drained; Chancellor—somewhat poorly drained
Depth to bedrock: Very deep
Depth to contrasting parent material: Egan—24 to 40 inches over loamy glacial till; Trent—40 to more than 60 inches over loamy glacial till; Chancellor—40 to more than 60 inches over loamy glacial till
Depth to the water table: Egan—more than 6 feet; Trent—3.5 to 5.0 feet; Chancellor—1 to 2 feet
Flooding: Egan—none; Trent—none; Chancellor—frequent for brief periods
Ponding: None
Permeability: Egan—moderately slow; Trent—moderate; Chancellor—slow
Available water capacity: High
Content of organic matter: Egan—moderate; Trent—high; Chancellor—high
Surface runoff: Low
Other features: Runoff water flows over areas of the Trent soil during periods of rainfall or snowmelt.

Inclusions

Contrasting inclusions:
• The poorly drained Tetonka soils in basins
• The moderately well drained Wakonda and Davison soils, which have free carbonates at or near the surface; on footslopes
• The somewhat poorly drained Whitewood soils on toeslopes

Similar inclusions:
• Soils that have glacial till at a greater depth than the Egan soil

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Well suited
Management concerns: Egan—conserving moisture; Trent—excess moisture during wet years; Chancellor—wetness
Management measures:
• Crop residue management conserves moisture and helps to maintain tilth and the content of organic matter.
• In wet years the Chancellor soil is better suited to late-planted crops than to other crops. Maintaining existing drainage systems helps to remove excess water.

Interpretive Groups

Land capability classification: Egan—I; Trent—I; Chancellor—IIw
Range site: Egan—Silty; Trent—Loamy Overflow; Chancellor—Loamy Overflow
Windbreak suitability group: Egan—3; Trent—1; Chancellor—2
Pasture suitability group: Egan—F; Trent—K; Chancellor—A

Em—Enet loam, 0 to 2 percent slopes, rarely flooded

Composition

Enet and similar soils: 80 to 95 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Flood plains
Position on the landform: High flood plains
Slope range: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 15 to 700 acres

Typical Profile

Surface layer:
0 to 8 inches—dark grayish brown loam

Subsurface layer:
8 to 12 inches—dark grayish brown loam

Subsoil:
12 to 20 inches—brown loam

20 to 28 inches—light olive brown silt loam

Underlying layers:
28 to 58 inches—yellowish brown loamy fine sand with redox concentrations
58 to 80 inches—light yellowish brown, calcareous fine sand with redox concentrations

Soil Properties and Qualities

Drainage class: Well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: 20 to 40 inches over sandy alluvium
Depth to the water table: 4 to 6 feet
Flooding: Rare
Ponding: None
Permeability: Moderate in the upper part and rapid in the lower part
Available water capacity: Moderate
Content of organic matter: Moderate
Surface runoff: Low

Inclusions

Contrasting inclusions:
• The moderately well drained Dalesburg soils, which have more sand and less clay than the Enet soil; on high flood plains
• The somewhat poorly drained Dimo soils on high flood plains

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Well suited
Management concerns: Limited available water capacity
Management measures:
• This soil is better suited to early maturing crops than to other crops. Minimizing tillage and leaving crop residue on the surface conserve moisture and help to maintain tilth and the content of organic matter.
• Irrigation helps to overcome the limited available water capacity if the quantity and quality of the water are adequate.

Interpretive Groups

Land capability classification: IIs
Range site: Loamy Overflow
Windbreak suitability group: 1
Pasture suitability group: K

EnB—Enet-Storla-Tetonka complex, 0 to 6 percent slopes

Composition

Enet and similar soils: 35 to 50 percent
Storla and similar soils: 20 to 35 percent
Tetonka and similar soils: 15 to 25 percent
Contrasting inclusions: 10 to 25 percent

Setting

Landform: Outwash plains
Position on the landform: Enet—backslopes; Storla—footslopes; Tetonka—basins
Slope range: Enet—1 to 6 percent; Storla—0 to 2 percent; Tetonka—0 to 1 percent
Shape of areas: Irregular
Size of areas: 20 to 250 acres

Typical Profile

Enet

Surface layer:
0 to 6 inches—dark grayish brown loam

Subsoil:
6 to 11 inches—dark grayish brown loam
11 to 26 inches—brown loam

Underlying layers:
26 to 60 inches—brown, calcareous gravelly loamy sand and gravelly sand
60 to 80 inches—yellowish brown and brown, calcareous gravelly sand

Storla

Surface layer:
0 to 9 inches—very dark gray, calcareous loam

Subsoil:
9 to 13 inches—dark gray, calcareous loam
13 to 25 inches—grayish brown, calcareous loam

Underlying layers:
25 to 44 inches—pale brown, calcareous gravelly loamy sand with redox concentrations
44 to 80 inches—brown and light brownish gray, calcareous gravelly sand and calcareous gravelly loamy sand with redox concentrations and redox depletions in the lower part

Tetonka

Surface layer:
0 to 8 inches—dark gray silt loam

Subsurface layer:
8 to 12 inches—gray silt loam

Subsoil:
12 to 20 inches—gray silt loam
20 to 31 inches—gray silty clay
31 to 59 inches—gray silty clay with redox concentrations

Underlying layer:
59 to 80 inches—gray silty clay loam with redox concentrations

Soil Properties and Qualities

Drainage class: Enet—well drained; Storla—moderately well drained; Tetonka—poorly drained
Depth to bedrock: Very deep
Depth to contrasting parent material: Enet—20 to 40 inches over outwash sand and gravel; Storla—20 to 36 inches over outwash sand and gravel; Tetonka—more than 60 inches
Water table: Enet—at a depth of more than 6 feet; Storla—at a depth of 2 to 4 feet; Tetonka—1 foot above to 1 foot below the surface
Flooding: None
Ponding: Enet—none; Storla—none; Tetonka—frequent for long periods
Permeability: Enet and Storla—moderate in the upper part and rapid in the lower part; Tetonka—slow
Available water capacity: Enet—moderate; Storla—moderate; Tetonka—high
Content of organic matter: Enet—moderate; Storla—moderate; Tetonka—high
Surface runoff: Enet—medium; Storla—low; Tetonka—negligible
Other properties: The Storla soil has a high content of lime.

Inclusions

Contrasting inclusions:
- The somewhat excessively drained Delmont soils, which have gravelly material at a depth of 14 to 20 inches; on backslopes
- The moderately well drained Davison soils, which do not have gravelly underlying material; on footslopes
- The somewhat poorly drained Chancellor soils on the lower toeslopes
- The well drained Clarno soils, which do not have gravelly underlying material; on the upper backslopes

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Fairly well suited
Management concerns: Enet—limited available water capacity; Storla—wind erosion, limited available water capacity, and the high content of lime, which adversely affects the availability of plant nutrients; Tetonka—wetness
Management measures:
- The Enet and Storla soils are better suited to early maturing crops than to other crops. Minimizing tillage and leaving crop residue on the surface conserve moisture and help to control erosion.
- Rotations that include grasses and legumes help to control erosion and maintain fertility, tilth, and the content of organic matter.
- Irrigation helps to overcome limited water storage if the quantity and quality of the water are adequate.
- In most years the Tetonka soil is better suited to late-planted crops than to other crops. Leaving crop residue on the surface and deferring tillage when the Tetonka soil is wet help to maintain tilth and minimize surface compaction. Maintaining existing drainage systems helps to remove excess water.

Interpretive Groups

Land capability classification: Enet—IIe; Storla—IIIs; Tetonka—IVw
Range site: Enet—Silty; Storla—Limy Subirrigated; Tetonka—Wet Meadow
Windbreak suitability group: Enet—6G; Storla—1K; Tetonka—10
Pasture suitability group: Enet—D1; Storla—F; Tetonka—B2

EoD—Ethan-Betts loams, 9 to 15 percent slopes

Composition

Ethan and similar soils: 55 to 70 percent
Betts and similar soils: 15 to 30 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Till plains
Position on the landform: Ethan—shoulder slopes and backslopes; Betts—upper shoulder slopes
Slope range: 9 to 15 percent
Shape of areas: Irregular
Size of areas: 10 to 250 acres

Typical Profile

Ethan

Surface layer:
0 to 8 inches—dark grayish brown, calcareous loam

Subsoil:
8 to 22 inches—light yellowish brown, calcareous clay loam
22 to 51 inches—pale yellow, calcareous clay loam with redox concentrations

Underlying layer:
51 to 80 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Betts

Surface layer:
0 to 4 inches—grayish brown, calcareous loam

Subsoil:
4 to 23 inches—light yellowish brown, calcareous clay loam
23 to 41 inches—pale yellow, calcareous clay loam with redox concentrations

Underlying layer:
41 to 80 inches—light yellowish brown, calcareous clay loam

Soil Properties and Qualities

Drainage class: Well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: More than 60 inches
Depth to the water table: More than 6 feet
Flooding: None
Ponding: None
Permeability: Moderately slow
Available water capacity: High
Content of organic matter: Moderately low
Surface runoff: High
Other properties: Both soils have a high content of lime.

Inclusions

Contrasting inclusions:
- The well drained Davis soils on footslopes
- The well drained Clarno soils on backslopes
- The somewhat excessively drained Delmont soils, which have gravelly material at a depth of 14 to 20 inches; on backslopes
- The well drained Bon soils on high flood plains

Use and Management

Rangeland and wildlife habitat

Suitability for crops: Generally unsuited
Management concerns: Wind erosion, water erosion, and the high content of lime, which adversely affects the availability of plant nutrients
Management measures:
- Seeding cultivated areas to adapted grasses helps to control erosion.
- Proper grazing management helps to maintain plant vigor and helps to control erosion.

Interpretive Groups

Land capability classification: Ethan—VIe; Betts—VIe
Range site: Ethan—Thin Upland; Betts—Thin Upland
Windbreak suitability group: Ethan—8; Betts—8
Pasture suitability group: Ethan—G; Betts—G

EoE—Ethan-Betts loams, 15 to 40 percent slopes

Composition

Ethan and similar soils: 50 to 65 percent
Betts and similar soils: 20 to 35 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Till plains
Position on the landform: Ethan—shoulder slopes and backslopes; Betts—upper shoulder slopes (fig. 13)
Slope range: 15 to 40 percent
Shape of areas: Irregular
Size of areas: 20 to 500 acres

Typical Profile

Ethan

Surface layer:
0 to 8 inches—dark grayish brown, calcareous loam

Subsoil:
8 to 22 inches—light yellowish brown, calcareous clay loam
22 to 51 inches—pale yellow, calcareous clay loam with redox concentrations

Underlying layer:
51 to 80 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Betts

Surface layer:
0 to 4 inches—grayish brown, calcareous loam

Subsoil:
4 to 23 inches—light yellowish brown, calcareous clay loam
23 to 41 inches—pale yellow, calcareous clay loam with redox concentrations

Underlying layer:
41 to 80 inches—light yellowish brown, calcareous clay loam

Soil Properties and Qualities

Drainage class: Well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: More than 60 inches
Depth to the water table: More than 6 feet
Flooding: None
Ponding: None
Permeability: Moderately slow
Available water capacity: High
Content of organic matter: Moderately low
Surface runoff: Very high
Other properties: Both soils have a high content of lime.

Inclusions

Contrasting inclusions:
- The excessively drained Talmo soils, which have gravelly material within a depth of 14 inches; in positions on the landform similar to those of the Ethan and Betts soils
- The well drained Davis soils on footslopes
- The well drained Clarno soils on backslopes
- The well drained Bon soils on high flood plains

Use and Management

Rangeland and wildlife habitat

Suitability for crops: Not suited
Management concerns: Wind erosion, water erosion, and the high content of lime, which adversely affects the availability of plant nutrients
Management measures:
- Proper grazing management helps to maintain plant vigor and helps to control erosion.

Interpretive Groups

Land capability classification: Ethan—VIIe; Betts—VIIe
Range site: Ethan—Thin Upland; Betts—Thin Upland
Windbreak suitability group: Ethan—10; Betts—10
Pasture suitability group: Ethan—NS; Betts—NS

EpD—Ethan-Bon, channeled, loams, 0 to 20 percent slopes

Composition

Ethan and similar soils: 50 to 65 percent
Bon and similar soils: 20 to 30 percent
Contrasting inclusions: 10 to 20 percent

Setting

Landform: Till plains and flood plains
Position on the landform: Ethan—shoulder slopes; Bon—high flood plains
Slope range: Ethan—9 to 20 percent; Bon—0 to 2 percent
Shape of areas: Elongated or irregular
Size of areas: 20 to 250 acres

Typical Profile

Ethan

Surface layer:
0 to 8 inches—dark grayish brown, calcareous loam

Subsoil:
8 to 22 inches—light yellowish brown, calcareous clay loam
22 to 51 inches—pale yellow, calcareous clay loam with redox concentrations

Underlying layer:
51 to 80 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Bon

Surface soil:
0 to 15 inches—dark gray, calcareous loam

Subsoil:
15 to 33 inches—very dark gray, calcareous loam
33 to 56 inches—dark gray, calcareous loam

Underlying layers:
56 to 60 inches—grayish brown, calcareous loam with redox concentrations
60 to 80 inches—grayish brown, calcareous clay loam with redox concentrations

Soil Properties and Qualities

Drainage class: Ethan—well drained; Bon—moderately well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: Ethan—more than 60 inches; Bon—40 to more than 60 inches over outwash sand and gravel
Depth to the water table: Ethan—more than 6 feet; Bon—3 to 5 feet
Flooding: Ethan—none; Bon—frequent for brief periods
Ponding: None
Permeability: Ethan—moderately slow; Bon—moderate
Available water capacity: High
Content of organic matter: Ethan—moderately low; Bon—high

Surface runoff: Ethan—high; Bon—low
Other features: The Ethan soil has a high content of lime. Areas of the Bon soil typically are dissected by a meandering channel (fig. 14).

Inclusions

Contrasting inclusions:
- The well drained Betts soils, which have a thinner surface layer than the Ethan soil; in positions on the landform similar to those of the Ethan soil
- The well drained Clarno soils on backslopes
- The well drained Davis soils on footslopes
- The somewhat excessively drained Delmont soils, which have gravelly material at a depth of 14 to 20 inches; on backslopes

Use and Management

Rangeland and wildlife habitat

Suitability for crops: Generally unsuited
Management concerns: Ethan—wind erosion, water erosion, and the high content of lime, which adversely affects the availability of plant nutrients; Bon—wetness and meandering channels, which limit cultivation
Management measures:
- Seeding cultivated areas to adapted grasses helps to control erosion.
- Proper grazing management helps to maintain plant vigor and helps to control erosion.

Interpretive Groups

Land capability classification: Ethan—VIe; Bon—VIw
Range site: Ethan—Thin Upland; Bon—Loamy Overflow
Windbreak suitability group: Ethan—8; Bon—1
Pasture suitability group: Ethan—G; Bon—NS

EpE—Ethan-Bon, channeled, loams, 0 to 40 percent slopes

Composition

Ethan and similar soils: 60 to 70 percent
Bon and similar soils: 15 to 25 percent
Contrasting inclusions: 10 to 25 percent

Setting

Landform: Till plains and flood plains
Position on the landform: Ethan—shoulder slopes; Bon—high flood plains
Slope range: Ethan—15 to 40 percent; Bon—0 to 2 percent
Shape of areas: Elongated or irregular
Size of areas: 10 to 250 acres

Typical Profile

Ethan

Surface layer:
0 to 8 inches—dark grayish brown, calcareous loam

Subsoil:
8 to 22 inches—light yellowish brown, calcareous clay loam
22 to 51 inches—pale yellow, calcareous clay loam with redox concentrations

Underlying layer:
51 to 80 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Bon

Surface soil:
0 to 15 inches—dark gray, calcareous loam

Subsoil:
15 to 33 inches—very dark gray, calcareous loam
33 to 56 inches—dark gray, calcareous loam

Underlying layers:
56 to 60 inches—grayish brown, calcareous loam with redox concentrations
60 to 80 inches—grayish brown, calcareous clay loam with redox concentrations

Soil Properties and Qualities

Drainage class: Ethan—well drained; Bon—moderately well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: Ethan—more than 60 inches; Bon—40 to more than 60 inches over outwash sand and gravel
Depth to the water table: Ethan—more than 6 feet; Bon—3 to 5 feet
Flooding: Ethan—none; Bon—frequent for brief periods
Ponding: None
Permeability: Ethan—moderately slow; Bon—moderate
Available water capacity: High
Content of organic matter: Ethan—moderately low; Bon—high
Surface runoff: Ethan—very high; Bon—low
Other features: The Ethan soil has a high content of lime. Areas of the Bon soil typically are dissected by a meandering channel.

Inclusions

Contrasting inclusions:
- The well drained Betts soils, which have a thinner

surface layer than the Ethan soil; in positions on the landform similar to those of the Ethan soil
- The well drained Clarno soils on backslopes
- The somewhat excessively drained Delmont soils, which have gravelly material at a depth of 14 to 20 inches; on backslopes
- The well drained Davis soils on footslopes

Use and Management

Rangeland and wildlife habitat

Suitability for crops: Not suited
Management concerns: Ethan—wind erosion, water erosion, and the high content of lime, which adversely affects the availability of plant nutrients; Bon—wetness and meandering channels, which limit cultivation
Management measures:
- Proper grazing management helps to maintain plant vigor and helps to control erosion.

Interpretive Groups

Land capability classification: Ethan—VIIe; Bon—VIw
Range site: Ethan—Thin Upland; Bon—Loamy Overflow
Windbreak suitability group: Ethan—10; Bon—1
Pasture suitability group: Ethan—NS; Bon—NS

ErC—Ethan-Clarno loams, 6 to 9 percent slopes

Composition

Ethan and similar soils: 40 to 55 percent
Clarno and similar soils: 30 to 45 percent
Contrasting inclusions: 10 to 25 percent

Setting

Landform: Till plains
Position on the landform: Ethan—shoulder slopes; Clarno—backslopes
Slope range: 6 to 9 percent
Shape of areas: Irregular
Size of areas: 10 to 250 acres

Typical Profile

Ethan

Surface layer:
0 to 8 inches—dark grayish brown, calcareous loam

Subsoil:
8 to 22 inches—light yellowish brown, calcareous clay loam
22 to 51 inches—pale yellow, calcareous clay loam with redox concentrations

Underlying layer:
51 to 80 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Clarno

Surface layer:
0 to 7 inches—dark grayish brown loam

Subsoil:
7 to 16 inches—brown loam
16 to 44 inches—light yellowish brown, calcareous clay loam with redox concentrations and redox depletions in the lower part
44 to 53 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Underlying layer:
53 to 80 inches—pale yellow, calcareous clay loam with redox concentrations

Soil Properties and Qualities

Drainage class: Well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: More than 60 inches
Depth to the water table: More than 6 feet
Flooding: None
Ponding: None
Permeability: Moderately slow
Available water capacity: High
Content of organic matter: Ethan—moderately low; Clarno—moderate
Surface runoff: Medium
Other properties: The Ethan soil has a high content of lime.

Inclusions

Contrasting inclusions:
- The well drained Egan soils on backslopes
- The somewhat poorly drained Chancellor soils on the lower toeslopes
- The moderately well drained Davison soils on footslopes
- The well drained Davis soils on footslopes

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Poorly suited
Management concerns: Ethan—wind erosion, water erosion, and the high content of lime, which adversely affects the availability of plant nutrients; Clarno—water erosion
Management measures:
- Minimizing tillage and leaving crop residue on the

surface conserve moisture and help to control erosion. Contour farming, terraces, and grassed waterways (fig. 15) help to control water erosion; in most areas, however, the slopes are too short or too irregular for contour farming or terraces.
• Applying animal wastes, especially on the Ethan soil, helps to maintain fertility and the content of organic matter. Rotations that include grasses and legumes help to control erosion and maintain fertility, tilth, and the content of organic matter.
• Stripcropping and field windbreaks help to control wind erosion.

Interpretive Groups

Land capability classification: Ethan—IVe; Clarno—IIIe
Range site: Ethan—Thin Upland; Clarno—Silty
Windbreak suitability group: Ethan—8; Clarno—3
Pasture suitability group: Ethan—G; Clarno—F

ErD—Ethan-Clarno loams, 9 to 15 percent slopes

Composition

Ethan and similar soils: 45 to 65 percent
Clarno and similar soils: 20 to 30 percent
Contrasting inclusions: 10 to 25 percent

Setting

Landform: Till plains
Position on the landform: Ethan—shoulder slopes; Clarno—backslopes
Slope range: 9 to 15 percent
Shape of areas: Irregular
Size of areas: 10 to 250 acres

Typical Profile

Ethan

Surface layer:
0 to 8 inches—dark grayish brown, calcareous loam

Subsoil:
8 to 22 inches—light yellowish brown, calcareous clay loam
22 to 51 inches—pale yellow, calcareous clay loam with redox concentrations

Underlying layer:
51 to 80 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Clarno

Surface layer:
0 to 7 inches—dark grayish brown loam

Subsoil:
7 to 16 inches—brown loam
16 to 44 inches—light yellowish brown, calcareous clay loam with redox concentrations and redox depletions in the lower part
44 to 53 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Underlying layer:
53 to 80 inches—pale yellow, calcareous clay loam with redox concentrations

Soil Properties and Qualities

Drainage class: Well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: More than 60 inches
Depth to the water table: More than 6 feet
Flooding: None
Ponding: None
Permeability: Moderately slow
Available water capacity: High
Content of organic matter: Ethan—moderately low; Clarno—moderate
Surface runoff: High
Other properties: The Ethan soil has a high content of lime.

Inclusions

Contrasting inclusions:
• The well drained Betts soils, which have a thinner surface layer than the Ethan soil; in positions on the landform similar to those of the Ethan soil
• The well drained Davis soils on footslopes
• The well drained Egan soils on backslopes
• The somewhat excessively drained Delmont soils, which have gravelly material at a depth of 14 to 20 inches; on backslopes

Use and Management

Rangeland and wildlife habitat

Suitability for crops: Generally unsuited
Management concerns: Ethan—wind erosion, water erosion, and the high content of lime, which adversely affects the availability of plant nutrients; Clarno—water erosion
Management measures:
• Seeding cultivated areas to adapted grasses helps to control erosion.
• Proper grazing management helps to maintain plant vigor and helps to control erosion.

Interpretive Groups

Land capability classification: Ethan—VIe; Clarno—IVe
Range site: Ethan—Thin Upland; Clarno—Silty
Windbreak suitability group: Ethan—8; Clarno—3
Pasture suitability group: Ethan—G; Clarno—F

EsB—Ethan-Clarno-Bon loams, 0 to 6 percent slopes

Composition

Ethan and similar soils: 35 to 50 percent
Clarno and similar soils: 20 to 35 percent
Bon and similar soils: 15 to 25 percent
Contrasting inclusions: 10 to 25 percent

Setting

Landform: Till plains and flood plains
Position on the landform: Ethan—shoulder slopes; Clarno—backslopes; Bon—high flood plains
Slope range: Ethan—2 to 6 percent; Clarno—2 to 6 percent; Bon—0 to 2 percent
Shape of areas: Elongated or irregular
Size of areas: 10 to 250 acres

Typical Profile

Ethan

Surface layer:
0 to 8 inches—dark grayish brown, calcareous loam

Subsoil:
8 to 22 inches—light yellowish brown, calcareous clay loam
22 to 51 inches—pale yellow, calcareous clay loam with redox concentrations

Underlying layer:
51 to 80 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Clarno

Surface layer:
0 to 7 inches—dark grayish brown loam

Subsoil:
7 to 16 inches—brown loam
16 to 44 inches—light yellowish brown, calcareous clay loam with redox concentrations and redox depletions in the lower part
44 to 53 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Underlying layer:
53 to 80 inches—pale yellow, calcareous clay loam with redox concentrations

Bon

Surface soil:
0 to 15 inches—dark gray, calcareous loam

Subsoil:
15 to 33 inches—very dark gray, calcareous loam
33 to 56 inches—dark gray, calcareous loam

Underlying layers:
56 to 60 inches—grayish brown, calcareous loam with redox concentrations
60 to 80 inches—grayish brown, calcareous clay loam with redox concentrations

Soil Properties and Qualities

Drainage class: Well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: Ethan—more than 60 inches; Clarno—more than 60 inches; Bon—40 to more than 60 inches over outwash sand and gravel or clayey alluvium
Depth to the water table: More than 6 feet
Flooding: Ethan—none; Clarno—none; Bon—occasional for brief periods
Ponding: None
Permeability: Ethan—moderately slow; Clarno—moderately slow; Bon—moderate
Available water capacity: High
Content of organic matter: Ethan—moderately low; Clarno—moderate; Bon—high
Surface runoff: Ethan—medium; Clarno—medium; Bon—low
Other properties: The Ethan soil has a high content of lime.

Inclusions

Contrasting inclusions:
- The well drained Egan soils, which have more silt and less sand in the upper 24 to 40 inches than the Clarno soil; in positions on the landform similar to those of the Clarno soil
- The moderately well drained Davison soils on footslopes
- The somewhat excessively drained Delmont soils, which have gravelly material at a depth of 14 to 20 inches; on backslopes
- The somewhat poorly drained Chancellor soils on the lower toeslopes

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Fairly well suited
Management concerns: Ethan—wind erosion, water erosion, and the high content of lime, which adversely affects the availability of plant nutrients; Clarno—water erosion; Bon—few concerns
Management measures:
- Minimizing tillage and leaving crop residue on the surface conserve moisture and help to control erosion.
- Rotations that include grasses and legumes help to control erosion and maintain fertility, tilth, and the content of organic matter.
- Stripcropping and field windbreaks help to control wind erosion.
- Applying animal wastes, especially on the Ethan soil, helps to maintain fertility and the content of organic matter.

Interpretive Groups

Land capability classification: Ethan—IIIe; Clarno—IIe; Bon—I
Range site: Ethan—Thin Upland; Clarno—Silty; Bon—Loamy Overflow
Windbreak suitability group: Ethan—8; Clarno—3; Bon—1
Pasture suitability group: Ethan—G; Clarno—F; Bon—K

EtC—Ethan-Clarno-Bon, channeled, loams, 0 to 9 percent slopes

Composition

Ethan and similar soils: 40 to 55 percent
Clarno and similar soils: 20 to 30 percent
Bon and similar soils: 15 to 30 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Till plains and flood plains
Position on the landform: Ethan—shoulder slopes; Clarno—backslopes; Bon—high flood plains
Slope range: Ethan—6 to 9 percent; Clarno—6 to 9 percent; Bon—0 to 2 percent
Shape of areas: Elongated or irregular
Size of areas: 10 to 250 acres

Typical Profile

Ethan

Surface layer:
0 to 8 inches—dark grayish brown, calcareous loam

Subsoil:
8 to 22 inches—light yellowish brown, calcareous clay loam
22 to 51 inches—pale yellow, calcareous clay loam with redox concentrations

Underlying layer:
51 to 80 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Clarno

Surface layer:
0 to 7 inches—dark grayish brown loam

Subsoil:
7 to 16 inches—brown loam
16 to 44 inches—light yellowish brown, calcareous clay loam with redox concentrations and redox depletions in the lower part
44 to 53 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Underlying layer:
53 to 80 inches—pale yellow, calcareous clay loam with redox concentrations

Bon

Surface soil:
0 to 15 inches—dark gray, calcareous loam

Subsoil:
15 to 33 inches—very dark gray, calcareous loam
33 to 56 inches—dark gray, calcareous loam

Underlying layers:
56 to 60 inches—grayish brown, calcareous loam with redox concentrations
60 to 80 inches—grayish brown, calcareous clay loam with redox concentrations

Soil Properties and Qualities

Drainage class: Ethan—well drained; Clarno—well drained; Bon—moderately well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: Ethan—more than 60 inches; Clarno—more than 60 inches; Bon—40 to more than 60 inches over outwash sand and gravel
Depth to the water table: Ethan—more than 6 feet; Clarno—more than 6 feet; Bon—3 to 5 feet
Flooding: Ethan—none; Clarno—none; Bon—rare
Ponding: None
Permeability: Ethan—moderately slow; Clarno—moderately slow; Bon—moderate
Available water capacity: High
Content of organic matter: Ethan—moderately low; Clarno—moderate; Bon—high

Surface runoff: Ethan—medium; Clarno—medium; Bon—low
Other features: The Ethan soil has a high content of lime. Areas of the Bon soil typically are dissected by a meandering channel.

Inclusions

Contrasting inclusions:
- The well drained Egan soils, which have more silt and less sand in the upper 24 to 40 inches than the Clarno soil; in positions on the landform similar to those of the Clarno soil
- The moderately well drained Davison soils on footslopes
- The well drained Davis soils on footslopes
- The somewhat excessively drained Delmont soils, which have gravelly material at a depth of 14 to 20 inches; on backslopes

Use and Management

Pasture and rangeland

Suitability for crops: Poorly suited
Management concerns: Ethan—wind erosion, water erosion, and the high content of lime, which adversely affects the availability of plant nutrients; Clarno—water erosion; Bon—wetness and meandering channels, which limit cultivation
Management measures:
- Seeding cultivated areas to adapted grasses helps to control erosion.
- Proper grazing management helps to maintain plant vigor and helps to control erosion.

Interpretive Groups

Land capability classification: Ethan—IVe; Clarno—IIIe; Bon—VIw
Range site: Ethan—Thin Upland; Clarno—Silty; Bon—Loamy Overflow
Windbreak suitability group: Ethan—8; Clarno—3; Bon—1
Pasture suitability group: Ethan—G; Clarno—F; Bon—NS

EuB—Ethan-Davison-Tetonka complex, 0 to 6 percent slopes

Composition

Ethan and similar soils: 25 to 35 percent
Davison and similar soils: 15 to 30 percent
Tetonka and similar soils: 15 to 30 percent
Contrasting inclusions: 15 to 25 percent

Setting

Landform: Till plains
Position on the landform: Ethan—shoulder slopes; Davison—footslopes; Tetonka—basins
Slope range: Ethan—2 to 6 percent; Davison—0 to 6 percent; Tetonka—0 to 1 percent
Shape of areas: Irregular
Size of areas: 20 to 500 acres

Typical Profile

Ethan

Surface layer:
0 to 8 inches—dark grayish brown, calcareous loam

Subsoil:
8 to 22 inches—light yellowish brown, calcareous clay loam
22 to 51 inches—pale yellow, calcareous clay loam with redox concentrations

Underlying layer:
51 to 80 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Davison

Surface layer:
0 to 8 inches—dark gray, calcareous loam

Subsoil:
8 to 15 inches—grayish brown, calcareous loam
15 to 24 inches—light brownish gray, calcareous loam
24 to 47 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions in the lower part

Underlying layer:
47 to 80 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Tetonka

Surface layer:
0 to 8 inches—dark gray silt loam

Subsurface layer:
8 to 12 inches—gray silt loam

Subsoil:
12 to 20 inches—gray silt loam
20 to 31 inches—gray silty clay
31 to 59 inches—gray silty clay with redox concentrations

Underlying layer:
59 to 80 inches—gray silty clay loam with redox concentrations

Soil Properties and Qualities

Drainage class: Ethan—well drained; Davison—moderately well drained; Tetonka—poorly drained
Depth to bedrock: Very deep
Depth to contrasting parent material: More than 60 inches
Water table: Ethan—at a depth of more than 6 feet; Davison—at a depth of 2 to 4 feet; Tetonka—1 foot above to 1 foot below the surface
Flooding: None
Ponding: Ethan—none; Davison—none; Tetonka—frequent for long periods
Permeability: Ethan—moderately slow; Davison—moderately slow; Tetonka—slow
Available water capacity: High
Content of organic matter: Ethan—moderately low; Davison—moderate; Tetonka—high
Surface runoff: Ethan—medium; Davison—medium; Tetonka—negligible
Other properties: The Ethan and Davison soils have a high content of lime.

Inclusions

Contrasting inclusions:
• The well drained Egan soils on backslopes
• The moderately well drained Trent soils, which are leached of free carbonates to a depth of more than 30 inches and have less sand than the Davison soil; in positions on the landform similar to those of the Davison soil
• The somewhat poorly drained Chancellor soils on the lower toeslopes
• The well drained Clarno soils on the upper backslopes

Similar inclusions:
• Soils that have more silt and less sand than the Davison soil

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Fairly well suited
Management concerns: Ethan—wind erosion, water erosion, and the high content of lime, which adversely affects the availability of plant nutrients; Davison—wind erosion and the high content of lime, which adversely affects the availability of plant nutrients; Tetonka—wetness
Management measures:
• Minimizing tillage and leaving crop residue on the surface conserve moisture and help to control erosion.
• Rotations that include grasses and legumes help to control erosion and maintain fertility, tilth, and the content of organic matter.
• Stripcropping and field windbreaks help to control wind erosion.
• Applying animal wastes in areas of the Ethan and Davison soils helps to maintain fertility and the content of organic matter.
• In most years the Tetonka soil is better suited to late-planted crops than to other crops. Leaving crop residue on the surface and deferring tillage when the Tetonka soil is wet help to maintain tilth and minimize surface compaction. Maintaining existing drainage systems helps to remove excess water.

Interpretive Groups

Land capability classification: Ethan—IIIe; Davison—IIe; Tetonka—IVw
Range site: Ethan—Thin Upland; Davison—Limy Subirrigated; Tetonka—Wet Meadow
Windbreak suitability group: Ethan—8; Davison—1K; Tetonka—10
Pasture suitability group: Ethan—G; Davison—F; Tetonka—B2

EvC—Ethan-Egan complex, 6 to 9 percent slopes

Composition

Ethan and similar soils: 40 to 60 percent
Egan and similar soils: 25 to 40 percent
Contrasting inclusions: 10 to 20 percent

Setting

Landform: Till plains
Position on the landform: Ethan—shoulder slopes; Egan—backslopes
Slope range: 6 to 9 percent
Shape of areas: Irregular
Size of areas: 20 to 100 acres

Typical Profile

Ethan

Surface layer:
0 to 8 inches—dark grayish brown, calcareous loam

Subsoil:
8 to 22 inches—light yellowish brown, calcareous clay loam
22 to 51 inches—pale yellow, calcareous clay loam with redox concentrations

Underlying layer:
51 to 80 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Egan

Surface layer:
0 to 8 inches—very dark grayish brown silty clay loam

Subsoil:
8 to 16 inches—dark grayish brown silty clay loam
16 to 26 inches—brown silty clay loam
26 to 34 inches—light yellowish brown, calcareous silty clay loam
34 to 54 inches—light yellowish brown, calcareous clay loam with redox concentrations and redox depletions in the lower 13 inches

Underlying layer:
54 to 80 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Soil Properties and Qualities

Drainage class: Well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: Ethan—more than 60 inches; Egan—24 to 40 inches over loamy glacial till
Depth to the water table: More than 6 feet
Flooding: None
Ponding: None
Permeability: Moderately slow
Available water capacity: High
Content of organic matter: Ethan—moderately low; Egan—moderate
Surface runoff: Medium
Other properties: The Ethan soil has a high content of lime.

Inclusions

Contrasting inclusions:
• The moderately well drained Davison and Trent soils on footslopes
• The somewhat poorly drained Chancellor soils on the lower toeslopes
• The well drained Clarno soils on the upper backslopes

Use and Management

Cropland and pasture

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Poorly suited
Management concerns: Ethan—wind erosion, water erosion, and the high content of lime, which adversely affects the availability of plant nutrients; Egan—water erosion
Management measures:
• Minimizing tillage and leaving crop residue on the surface conserve moisture and help to control erosion.
• Contour farming, terraces, and grassed waterways help to control water erosion; in most areas, however, the slopes are too short or too irregular for contour farming or terraces.
• Applying animal wastes, especially on the Ethan soil, helps to maintain fertility and the content of organic matter.
• Rotations that include grasses and legumes help to control erosion and maintain fertility, tilth, and the content of organic matter.
• Stripcropping and field windbreaks help to control wind erosion.

Interpretive Groups

Land capability classification: Ethan—IVe; Egan—IIIe
Range site: Ethan—Thin Upland; Egan—Silty
Windbreak suitability group: Ethan—8; Egan—3
Pasture suitability group: Ethan—G; Egan—F

EzE—Ethan-Talmo complex, 15 to 40 percent slopes

Composition

Ethan and similar soils: 45 to 65 percent
Talmo and similar soils: 20 to 40 percent
Contrasting inclusions: 10 to 25 percent

Setting

Landform: Till plains
Position on the landform: Ethan—shoulder slopes and backslopes; Talmo—upper shoulder slopes
Slope range: 15 to 40 percent
Shape of areas: Irregular
Size of areas: 10 to 500 acres

Typical Profile

Ethan

Surface layer:
0 to 8 inches—dark grayish brown, calcareous loam

Subsoil:
8 to 22 inches—light yellowish brown, calcareous clay loam
22 to 51 inches—pale yellow, calcareous clay loam with redox concentrations

Underlying layer:
51 to 80 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Talmo

Surface layer:
0 to 9 inches—dark gray, calcareous gravelly loam

Figure 10.—No-till soybeans in an area of Egan-Chancellor-Davison complex, 0 to 3 percent slopes. The Chancellor soil is in the wetter areas below the Davison and Egan soils.

Figure 11.—Corn in an area of Egan-Ethan-Trent complex, 1 to 6 percent slopes.

Figure 12.—No-till soybeans in an area of Egan-Trent silty clay loams, 0 to 2 percent slopes. The Egan soil is in the foreground, and the Trent soil is on footslopes in the background.

Figure 13.—A pasture in an area of Ethan-Betts loams, 15 to 40 percent slopes. The Ethan soil is lower than the Betts soil on the landscape.

Figure 14.—An area of Ethan-Bon, channeled, loams, 0 to 20 percent slopes. The Ethan soil is on shoulder slopes alongside the channeled drainageway. The Bon soil is in the channel and in areas immediately adjacent to the channel in the drainageway.

Figure 15.—Contour farming and a grassed waterway in an area of Ethan-Clarno loams, 6 to 9 percent slopes.

Figure 16.—An area of Napa-Luton complex, 0 to 2 percent slopes, on the flood plain along the Missouri River. The Napa soil is in the sparsely vegetated areas. The Luton soil is well suited to pasture and hay.

Figure 17.—An area of Norway loamy fine sand, 0 to 4 percent slopes, and Norway-Meckling loamy fine sands, 0 to 4 percent slopes, on the flood plain along the Missouri River. The Norway soil is in the lower positions in meander channels or on islands. The Meckling soil is in the higher positions on meander belts.

Underlying layers:
9 to 66 inches—brown and yellowish brown, calcareous gravelly sand and calcareous very gravelly sand
66 to 80 inches—reddish yellow, calcareous fine sand

Soil Properties and Qualities

Drainage class: Ethan—well drained; Talmo—excessively drained
Depth to bedrock: Very deep
Depth to contrasting parent material: Ethan—more than 60 inches; Talmo—5 to 14 inches over outwash sand and gravel
Depth to the water table: More than 6 feet
Flooding: None
Ponding: None
Permeability: Ethan—moderately slow; Talmo—rapid
Available water capacity: Ethan—high; Talmo—low
Content of organic matter: Moderately low
Surface runoff: Ethan—very high; Talmo—medium
Other properties: The Ethan soil has a high content of lime.

Inclusions

Contrasting inclusions:
• The well drained Betts soils, which have a thinner surface layer than the Ethan soil; in positions on the landform similar to those of the Ethan soil
• The well drained Clarno soils on backslopes
• The well drained Davis soils on footslopes
• The somewhat excessively drained Delmont soils, which have gravelly material at a depth of 14 to 20 inches; on backslopes

Use and Management

Rangeland and wildlife habitat

Suitability for crops: Not suited
Management concerns: Ethan—wind erosion, water erosion, and the high content of lime, which adversely affects the availability of plant nutrients; Talmo—restricted available water capacity, water erosion
Management measures:
• Proper grazing management helps to maintain plant vigor and helps to control erosion.

Interpretive Groups

Land capability classification: Ethan—VIIe; Talmo—VIIIe
Range site: Ethan—Thin Upland; Talmo—Very Shallow
Windbreak suitability group: Ethan—10; Talmo—10
Pasture suitability group: Ethan—NS; Talmo—NS

Fo—Forney silty clay, 0 to 2 percent slopes

Composition

Forney and similar soils: 75 to 90 percent
Contrasting inclusions: 10 to 25 percent

Setting

Landform: Flood plains
Position on the landform: Valley flats
Slope range: 0 to 2 percent
Shape of areas: Elongated or irregular
Size of areas: 10 to 250 acres

Typical Profile

Surface layer:
0 to 8 inches—dark grayish brown silty clay

Underlying layers:
8 to 68 inches—grayish brown, dark gray, gray, and light olive brown, calcareous silty clay with redox concentrations
68 to 80 inches—light brownish gray, calcareous silt loam with redox concentrations

Soil Properties and Qualities

Drainage class: Somewhat poorly drained
Depth to bedrock: Very deep
Depth to contrasting parent material: More than 60 inches
Depth to the water table: 1.5 to 3.0 feet
Flooding: Very rare
Ponding: None
Permeability: Very slow
Available water capacity: Moderate
Content of organic matter: Moderate
Surface runoff: Low

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Owego soils, which have a layer of loamy material above a depth of 24 inches; in positions on the landform similar to those of the Forney soil
• The poorly drained Albaton soils, which have free carbonates at or near the surface and do not have thick dark buried horizons; in positions on the landform similar to those of the Forney soil
• The moderately well drained Onawa soils, which have loamy underlying layers; in the slightly higher positions on the landform

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Well suited
Management concerns: Wetness
Management measures:
• In wet years this soil is better suited to late-planted crops than to other crops. Leaving crop residue on the surface and deferring tillage when the soil is wet help to maintain tilth and minimize surface compaction.
• Rotations that include grasses and legumes help to control erosion and maintain fertility, tilth, and the content of organic matter.
• Maintaining existing drainage systems helps to remove excess water.

Interpretive Groups

Land capability classification: IIw
Range site: Clayey Overflow
Windbreak suitability group: 2
Pasture suitability group: A

Ga—Grable silt loam, 0 to 2 percent slopes

Composition

Grable and similar soils: 75 to 90 percent
Contrasting inclusions: 10 to 25 percent

Setting

Landform: Flood plains
Position on the landform: Valley flats
Slope range: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 10 to 500 acres

Typical Profile

Surface layer:
0 to 8 inches—dark grayish brown, calcareous silt loam

Underlying layers:
8 to 26 inches—grayish brown (with redox concentrations), calcareous very fine sandy loam with thin strata of loamy very fine sand, very fine sand, and silt loam
26 to 80 inches—light brownish gray (with redox concentrations), calcareous very fine sandy loam with very fine sand, silt loam, and silty clay loam

Soil Properties and Qualities

Drainage class: Well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: 18 to 30 inches over sandy alluvium
Depth to the water table: More than 6 feet
Flooding: Very rare
Ponding: None
Permeability: Moderate in the upper part and rapid in the lower part
Available water capacity: Moderate
Content of organic matter: Moderately low
Surface runoff: Low

Inclusions

Contrasting inclusions:
• The well drained Haynie soils, which do not have sandy material above a depth of 40 inches; in positions on the landform similar to those of the Grable soil
• The well drained Ticonic soils, which have sandy material to the surface; in positions on the landform similar to those of the Grable soil
• The moderately well drained Scroll soils, which have a clayey surface layer; on valley flats

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Well suited
Management concerns: Wind erosion, limited available water capacity
Management measures:
• This soil is better suited to early maturing crops than to other crops. Minimizing tillage and leaving crop residue on the surface conserve moisture and help to control erosion.
• Rotations that include grasses and legumes help to control erosion and maintain fertility, tilth, and the content of organic matter.
• Irrigation helps to overcome the limited available water capacity if the quantity and quality of the water are adequate.

Interpretive Groups

Land capability classification: IIs
Range site: Silty
Windbreak suitability group: 1K
Pasture suitability group: D1

Gt—Grable-Ticonic-Vore complex, 0 to 2 percent slopes

Composition

Grable and similar soils: 40 to 55 percent
Ticonic and similar soils: 20 to 35 percent

Vore and similar soils: 15 to 25 percent
Contrasting inclusions: 10 to 25 percent

Setting

Landform: Flood plains
Position on the landform: Valley flats
Slope range: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 25 to 750 acres

Typical Profile

Grable

Surface layer:
0 to 8 inches—dark grayish brown, calcareous silt loam

Underlying layers:
8 to 26 inches—grayish brown (with redox concentrations), calcareous very fine sandy loam with thin strata of loamy very fine sand, very fine sand, and silt loam
26 to 80 inches—light brownish gray (with redox concentrations), calcareous very fine sandy loam with very fine sand, silt loam, and silty clay loam

Ticonic

Surface layer:
0 to 9 inches—grayish brown, calcareous loamy fine sand

Underlying layers:
9 to 26 inches—light olive brown, calcareous loamy fine sand
26 to 80 inches—light brownish gray, calcareous, stratified loamy fine sand, fine sand, silt loam, very fine sandy loam, and sand

Vore

Surface layer:
0 to 8 inches—grayish brown, calcareous silty clay

Underlying layers:
8 to 23 inches—light brownish gray (with redox concentrations), calcareous silty clay loam with thin strata of silt loam and silty clay
23 to 80 inches—light brownish gray (with redox concentrations), calcareous loamy fine sand and calcareous fine sand

Soil Properties and Qualities

Drainage class: Grable—well drained; Ticonic—well drained; Vore—moderately well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: Grable—18 to 30 inches over sandy alluvium; Ticonic—18 to 36 inches over loamy alluvium; Vore—15 to 30 inches over sandy alluvium
Depth to the water table: Grable—more than 6 feet; Ticonic—more than 6 feet; Vore—3 to 5 feet
Flooding: Very rare
Ponding: None
Permeability: Grable—moderate in the upper part and rapid in the lower part; Ticonic—rapid in the upper part and moderate in the lower part; Vore—moderate in the upper part and rapid in the lower part
Available water capacity: Grable—moderate; Ticonic—low; Vore—moderate
Content of organic matter: Grable—moderately low; Ticonic—low; Vore—moderate
Surface runoff: Grable—low; Ticonic—very low; Vore—low

Inclusions

Contrasting inclusions:
• The well drained Haynie soils, which do not have sandy material above a depth of 40 inches; on valley flats
• The moderately well drained Lossing soils, which do not have sandy material above a depth of 40 inches; on valley flats
• The moderately well drained Blake soils, which do not have sandy material above a depth of 40 inches; on valley flats
• The excessively drained Sardak soils, which are sandy throughout; in positions on the landform similar to those of the Ticonic soil

Use and Management

Cropland

Main crops: Corn, oats, and soybeans
Suitability for crops: Well suited
Management concerns: Wind erosion, limited available water capacity
Management measures:
• These soils are better suited to early maturing crops than to other crops. Minimizing tillage and leaving crop residue on the surface conserve moisture and help to control erosion.
• Stripcropping and field windbreaks help to control wind erosion.
• Irrigation helps to overcome the limited available water capacity if the quantity and quality of the water are adequate.

• Rotations that include grasses and legumes help to control erosion and maintain fertility, tilth, and the content of organic matter.

Interpretive Groups

Land capability classification: Grable—IIs; Ticonic—IIIs; Vore—IIs
Range site: Grable—Silty; Ticonic—Sandy; Vore—Clayey Overflow
Windbreak suitability group: Grable—1K; Ticonic—5; Vore—1K
Pasture suitability group: Grable—D1; Ticonic—H; Vore—I

Gv—Grable-Vore-Haynie complex, 0 to 3 percent slopes

Composition

Grable and similar soils: 30 to 45 percent
Vore and similar soils: 20 to 30 percent
Haynie and similar soils: 20 to 30 percent
Contrasting inclusions: 10 to 20 percent

Setting

Landform: Flood plains
Position on the landform: Valley flats
Slope range: Grable—0 to 3 percent; Vore—0 to 2 percent; Haynie—0 to 2 percent
Shape of areas: Irregular
Size of areas: 50 to 500 acres

Typical Profile

Grable

Surface layer:
0 to 8 inches—dark grayish brown, calcareous silt loam

Underlying layers:
8 to 26 inches—grayish brown (with redox concentrations), calcareous very fine sandy loam with thin strata of loamy very fine sand, very fine sand, and silt loam
26 to 80 inches—light brownish gray (with redox concentrations), calcareous very fine sandy loam with very fine sand, silt loam, and silty clay loam

Vore

Surface layer:
0 to 8 inches—grayish brown, calcareous silty clay

Underlying layers:
8 to 23 inches—light brownish gray (with redox concentrations), calcareous silty clay loam with thin strata of silt loam and silty clay
23 to 80 inches—light brownish gray (with redox concentrations), calcareous loamy fine sand and calcareous fine sand

Haynie

Surface layer:
0 to 9 inches—dark grayish brown, calcareous silt loam

Underlying layer:
9 to 80 inches—grayish brown (with redox concentrations and redox depletions in the lower part), calcareous silt loam with thin strata of very fine sandy loam, loamy fine sand, silty clay loam, and silty clay

Soil Properties and Qualities

Drainage class: Grable—well drained; Vore—moderately well drained; Haynie—well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: Grable—18 to 30 inches over sandy alluvium; Vore—15 to 30 inches over sandy alluvium; Haynie—40 to more than 60 inches over sandy alluvium
Depth to the water table: Grable—more than 6 feet; Vore—3 to 5 feet; Haynie—more than 6 feet
Flooding: Very rare
Ponding: None
Permeability: Grable and Vore—moderate in the upper part and rapid in the lower part; Haynie—moderate
Available water capacity: Grable—moderate; Vore—moderate; Haynie—high
Content of organic matter: Grable—moderately low; Vore—moderate; Haynie—moderately low
Surface runoff: Low

Inclusions

Contrasting inclusions:
• The moderately well drained Blake soils, which have more clay in the upper part than the Grable and Haynie soils; in positions on the landform similar to those of the Grable and Haynie soils
• The moderately well drained Modale soils, which have clayey material at a depth of 18 to 30 inches; on valley flats
• The moderately well drained Lossing and Onawa soils, which do not have sandy material above a depth of 40 inches; on valley flats

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Well suited

Management concerns: Grable and Vore—wind erosion, limited available water capacity; Haynie—conserving moisture

Management measures:

• The Grable and Vore soils are better suited to early maturing crops than to other crops. Minimizing tillage and leaving crop residue on the surface conserve moisture and help to control erosion. Rotations that include grasses and legumes help to control erosion and maintain fertility, tilth, and the content of organic matter.

• Irrigation helps to overcome the limited available water capacity if the quantity and quality of the water are adequate.

Interpretive Groups

Land capability classification: Grable—IIs; Vore—IIs; Haynie—I

Range site: Grable—Silty; Vore—Clayey Overflow; Haynie—Silty

Windbreak suitability group: Grable—1K; Vore—1K; Haynie—1K

Pasture suitability group: Grable—D1; Vore—I; Haynie—F

Ha—Haynie silt loam, 0 to 2 percent slopes

Composition

Haynie and similar soils: 75 to 90 percent
Contrasting inclusions: 10 to 25 percent

Setting

Landform: Flood plains
Position on the landform: Valley flats
Slope range: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 10 to 500 acres

Typical Profile

Surface layer:

0 to 9 inches—dark grayish brown, calcareous silt loam

Underlying layer:

9 to 80 inches—grayish brown (with redox concentrations and redox depletions in the lower part), calcareous silt loam with thin strata of very fine sandy loam, loamy fine sand, silty clay loam, and silty clay

Soil Properties and Qualities

Drainage class: Well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: 40 to more than 60 inches over sandy alluvium
Depth to the water table: More than 6 feet
Flooding: Very rare
Ponding: None
Permeability: Moderate
Available water capacity: High
Content of organic matter: Moderately low
Surface runoff: Low

Inclusions

Contrasting inclusions:

• The well drained Grable soils, which have sandy material at a depth of 18 to 30 inches; in positions on the landform similar to those of the Haynie soil

• The moderately well drained Lossing and Vore soils, which have a clayey surface layer; on valley flats

• The moderately well drained Blake soils, which have more clay than the Haynie soil; in positions on the landform similar to those of the Haynie soil

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, soybeans
Suitability for crops: Well suited
Management concerns: Conserving moisture
Management measures:

• Crop residue management conserves moisture and helps to maintain tilth and the content of organic matter.

Interpretive Groups

Land capability classification: I
Range site: Silty
Windbreak suitability group: 1K
Pasture suitability group: F

Hg—Haynie-Grable silt loams, 0 to 2 percent slopes

Composition

Haynie and similar soils: 40 to 50 percent
Grable and similar soils: 35 to 45 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Flood plains
Position on the landform: Valley flats
Slope range: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 50 to 1,000 acres

Typical Profile

Haynie

Surface layer:
0 to 9 inches—dark grayish brown, calcareous silt loam

Underlying layer:
9 to 80 inches—grayish brown (with redox concentrations and redox depletions in the lower part), calcareous silt loam with thin strata of very fine sandy loam, loamy fine sand, silty clay loam, and silty clay

Grable

Surface layer:
0 to 8 inches—dark grayish brown, calcareous silt loam

Underlying layers:
8 to 26 inches—grayish brown (with redox concentrations), calcareous very fine sandy loam with thin strata of loamy very fine sand, very fine sand, and silt loam
26 to 80 inches—light brownish gray (with redox concentrations), calcareous very fine sandy loam with very fine sand, silt loam, and silty clay loam

Soil Properties and Qualities

Drainage class: Well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: Haynie—40 to more than 60 inches over sandy alluvium; Grable—18 to 30 inches over sandy alluvium
Depth to the water table: More than 6 feet
Flooding: Very rare
Ponding: None
Permeability: Haynie—moderate; Grable—moderate in the upper part and rapid in the lower part
Available water capacity: Haynie—high; Grable—moderate
Content of organic matter: Moderately low
Surface runoff: Low

Inclusions

Contrasting inclusions:
• The excessively drained Sardak soils, which are sandy throughout; on terrace risers
• The moderately well drained Lossing and Vore soils on valley flats
• The moderately well drained Blake soils, which have more clay in the upper part than the Haynie soil; in positions on the landform similar to those of the Haynie soil

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Well suited
Management concerns: Haynie—conserving moisture; Grable—wind erosion, limited available water capacity
Management measures:
• The Grable soil is better suited to early maturing crops than to other crops. Minimizing tillage and leaving crop residue on the surface conserve moisture and help to control erosion. Rotations that include grasses and legumes help to control erosion and maintain fertility, tilth, and the content of organic matter.
• Irrigation helps to overcome the limited available water capacity if the quantity and quality of the water are adequate.

Interpretive Groups

Land capability classification: Haynie—I; Grable—IIs
Range site: Haynie—Silty; Grable—Silty
Windbreak suitability group: Haynie—1K; Grable—1K
Pasture suitability group: Haynie—F; Grable—D1

Hn—Haynie-Lossing-Grable complex, 0 to 2 percent slopes

Composition

Haynie and similar soils: 35 to 50 percent
Lossing and similar soils: 20 to 35 percent
Grable and similar soils: 15 to 30 percent
Contrasting inclusions: 10 to 25 percent

Setting

Landform: Flood plains
Position on the landform: Valley flats
Slope range: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 50 to 750 acres

Typical Profile

Haynie

Surface layer:
0 to 9 inches—dark grayish brown, calcareous silt loam

Underlying layer:
9 to 80 inches—grayish brown (with redox concentrations and redox depletions in the lower part), calcareous silt loam with thin strata of very

fine sandy loam, loamy fine sand, silty clay loam, and silty clay

Lossing

Surface layer:
0 to 8 inches—dark grayish brown silty clay

Subsoil:
8 to 13 inches—grayish brown, calcareous silty clay with redox concentrations

Underlying layers:
13 to 72 inches—grayish brown and light brownish gray (with redox concentrations), calcareous silty clay loam with thin strata of silt loam and silty clay and calcareous silt loam with thin strata of fine sandy loam, silty clay loam, and silty clay
72 to 80 inches—olive gray and gray, calcareous silty clay with redox concentrations

Grable

Surface layer:
0 to 8 inches—dark grayish brown, calcareous silt loam

Underlying layers:
8 to 26 inches—grayish brown (with redox concentrations), calcareous very fine sandy loam with thin strata of loamy very fine sand, very fine sand, and silt loam
26 to 80 inches—light brownish gray (with redox concentrations), calcareous very fine sandy loam with very fine sand, silt loam, and silty clay loam

Soil Properties and Qualities

Drainage class: Haynie—well drained; Lossing—moderately well drained; Grable—well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: Haynie—40 to more than 60 inches over sandy alluvium; Lossing—6 to 20 inches over loamy alluvium; Grable—18 to 30 inches over sandy alluvium
Depth to the water table: Haynie—more than 6 feet; Lossing—3 to 5 feet; Grable—more than 6 feet
Flooding: Very rare
Ponding: None
Permeability: Haynie—moderate; Lossing—slow; Grable—moderate in the upper part and rapid in the lower part
Available water capacity: Haynie—high; Lossing—high; Grable—moderate
Content of organic matter: Haynie—moderately low; Lossing—moderate; Grable—moderately low
Surface runoff: Low

Inclusions

Contrasting inclusions:
• The moderately well drained Vore soils, which have sandy material at a depth of 15 to 30 inches; on valley flats
• The moderately well drained Blake soils, which have more clay in the upper part than the Haynie and Grable soils; in positions on the landform similar to those of the Haynie and Grable soils
• The moderately well drained Modale soils, which have clayey material at a depth of 18 to 30 inches; on valley flats
• The moderately well drained Onawa soils, which have thicker clayey material in the upper part than the Lossing soil; in positions on the landform similar to those of the Lossing soil

Use and Management

Cropland

Main crops: Corn and soybeans
Suitability for crops: Well suited
Management concerns: Haynie and Lossing—conserving moisture; Grable—limited available water capacity
Management measures:
• Minimizing tillage and leaving crop residue on the surface conserve moisture and help to control erosion.
• The Grable soil is better suited to early maturing crops than to other crops. Rotations that include grasses and legumes help to control erosion and maintain fertility, tilth, and the content of organic matter.

Interpretive Groups

Land capability classification: Haynie—I; Lossing—I; Grable—IIs
Range site: Haynie—Silty; Lossing—Clayey Overflow; Grable—Silty
Windbreak suitability group: Haynie—1K; Lossing—1K; Grable—1K
Pasture suitability group: Haynie—F; Lossing—I; Grable—D1

Ho—Haynie-Onawa-Blake complex, 0 to 2 percent slopes

Composition

Haynie and similar soils: 35 to 50 percent
Onawa and similar soils: 20 to 35 percent
Blake and similar soils: 15 to 30 percent
Contrasting inclusions: 10 to 25 percent

Setting

Landform: Flood plains
Position on the landform: Valley flats
Slope range: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 50 to 1,000 acres

Typical Profile

Haynie

Surface layer:
0 to 9 inches—dark grayish brown, calcareous silt loam

Underlying layer:
9 to 80 inches—grayish brown (with redox concentrations and redox depletions in the lower part), calcareous silt loam with thin strata of very fine sandy loam, loamy fine sand, silty clay loam, and silty clay

Onawa

Surface layer:
0 to 7 inches—dark grayish brown, calcareous silty clay

Underlying layers:
7 to 25 inches—grayish brown, calcareous silty clay with redox concentrations
25 to 80 inches—light brownish gray (with redox concentrations), calcareous silt loam with thin strata of very fine sandy loam and silty clay loam; calcareous very fine sandy loam with thin strata of silt loam and silty clay loam; and calcareous loamy very fine sand with thin strata of very fine sandy loam and silt loam

Blake

Surface layer:
0 to 9 inches—gray, calcareous silty clay loam

Underlying layers:
9 to 25 inches—grayish brown, calcareous silty clay loam with redox concentrations
25 to 80 inches—light brownish gray (with redox concentrations), calcareous silt loam with thin strata of very fine sandy loam and silty clay loam and calcareous very fine sandy loam with thin strata of silt loam and silty clay loam

Soil Properties and Qualities

Drainage class: Haynie—well drained; Onawa—moderately well drained; Blake—moderately well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: Haynie—40 to more than 60 inches over sandy alluvium; Onawa—18 to 30 inches over loamy alluvium; Blake—40 to more than 60 inches over sandy alluvium
Depth to the water table: Haynie—more than 6 feet; Onawa—3 to 5 feet; Blake—3 to 5 feet
Flooding: Very rare
Ponding: None
Permeability: Haynie—moderate; Onawa—slow; Blake—moderate
Available water capacity: High
Content of organic matter: Haynie—moderately low; Onawa—moderate; Blake—moderately low
Surface runoff: Low

Inclusions

Contrasting inclusions:
- The well drained Grable soils, which have sandy material at a depth of 18 to 30 inches; on valley flats
- The moderately well drained Vore soils, which have sandy material at a depth of 15 to 30 inches; on valley flats
- The moderately well drained Modale soils, which have clayey material at a depth of 18 to 30 inches; on valley flats
- The poorly drained Albaton soils, which are clayey throughout; on valley flats

Use and Management

Cropland

Main crops: Alfalfa, corn, and soybeans
Suitability for crops: Well suited
Management concerns: Haynie and Blake—conserving moisture; Onawa—limited available water capacity
Management measures:
- Minimizing tillage and leaving crop residue on the surface conserve moisture and help to control erosion.
- The Onawa soil is better suited to early maturing crops than to other crops. Rotations that include grasses and legumes help to control erosion and maintain fertility, tilth, and the content of organic matter.

Interpretive Groups

Land capability classification: Haynie—I; Onawa—IIs; Blake—I
Range site: Haynie—Silty; Onawa—Clayey Overflow; Blake—Silty
Windbreak suitability group: Haynie—1K; Onawa—1K; Blake—1K
Pasture suitability group: Haynie—F; Onawa—I; Blake—F

Ja—James silty clay, 0 to 1 percent slopes

Composition

James and similar soils: 80 to 95 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Flood plains
Position on the landform: Low flood plains
Slope range: 0 to 1 percent
Shape of areas: Irregular
Size of areas: 25 to 1,000 acres

Typical Profile

Surface soil:
0 to 16 inches—very dark gray, calcareous silty clay with masses of salt

Subsoil:
16 to 22 inches—very dark gray, calcareous silty clay with masses of salt
22 to 38 inches—very dark gray, calcareous silty clay with masses of salt and nests of gypsum
38 to 50 inches—grayish brown, calcareous silty clay with redox concentrations; masses of salt and nests of gypsum
50 to 58 inches—dark gray, calcareous silty clay with redox concentrations; nests of gypsum and slickensides

Underlying layer:
58 to 80 inches—olive gray silty clay with redox concentrations

Soil Properties and Qualities

Drainage class: Poorly drained
Depth to bedrock: Very deep
Depth to contrasting parent material: More than 60 inches
Water table: At the surface to 1 foot below the surface
Flooding: Frequent for long periods
Ponding: None
Permeability: Slow or very slow
Available water capacity: Moderate
Content of organic matter: Moderate
Surface runoff: Very low
Other properties: This soil has a high content of lime and salt.

Inclusions

Contrasting inclusions:
• The poorly drained Luton soils, which are leached of free carbonates and salts to a depth of more than 36 inches; on low flood plains
• The poorly drained Salmo soils, which have less clay than the James soil; on low flood plains

Similar inclusions:
• Soils that are leached of salts in the upper part of the profile

Use and Management

Pasture and rangeland

Suitability for crops: Generally unsuited
Management concerns: Wetness, the high content of salt, and the high content of lime, which adversely affects the availability of plant nutrients
Management measures:
• In most years this soil is better suited to late-planted crops or to permanent pasture or hayland species than to other plants.
• Proper grazing management helps to maintain plant vigor.
• Maintaining existing drainage systems helps to remove excess water.

Interpretive Groups

Land capability classification: VIs
Range site: Saline Lowland
Windbreak suitability group: 10
Pasture suitability group: J

La—Lakeport silty clay loam, 0 to 2 percent slopes

Composition

Lakeport and similar soils: 80 to 90 percent
Contrasting inclusions: 10 to 20 percent

Setting

Landform: Flood plains
Position on the landform: Valley flats
Slope range: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 10 to 250 acres

Typical Profile

Surface soil:
0 to 17 inches—dark gray silty clay loam

Subsoil:
17 to 22 inches—dark grayish brown silty clay loam with redox concentrations
22 to 38 inches—grayish brown silty clay loam with redox concentrations

Underlying layers:
38 to 58 inches—light brownish gray, calcareous silt

loam with redox concentrations and redox depletions
58 to 80 inches—light brownish gray, calcareous very fine sandy loam with redox concentrations and redox depletions

Soil Properties and Qualities

Drainage class: Moderately well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: More than 60 inches
Depth to the water table: 3 to 5 feet
Flooding: Very rare
Ponding: None
Permeability: Moderately slow
Available water capacity: High
Content of organic matter: Moderate
Surface runoff: Low

Inclusions

Contrasting inclusions:
• The moderately well drained Salix soils, which have less clay than the Lakeport soil; on valley flats
• The somewhat poorly drained Forney soils in the slightly lower positions on the landform

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Well suited
Management concerns: Wetness (in some years)
Management measures:
• Crop residue management conserves moisture and helps to maintain tilth and the content of organic matter.
• In wet years this soil is better suited to late-planted crops than to other crops. Leaving crop residue on the surface and deferring tillage when the soil is wet help to maintain tilth and the content of organic matter.

Interpretive Groups

Land capability classification: I
Range site: Clayey Overflow
Windbreak suitability group: 1
Pasture suitability group: A

Lb—Lamo silty clay loam, 0 to 2 percent slopes

Composition

Lamo and similar soils: 80 to 90 percent
Contrasting inclusions: 10 to 20 percent

Setting

Landform: Flood plains
Position on the landform: High flood plains
Slope range: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 10 to 500 acres

Typical Profile

Surface layer:
0 to 10 inches—dark gray, calcareous silty clay loam

Subsoil:
10 to 39 inches—grayish brown, calcareous silty clay loam with redox concentrations

Underlying layers:
39 to 58 inches—light brownish gray and grayish brown, calcareous silty clay loam and silty clay with redox concentrations
58 to 80 inches—light grayish brown and grayish brown (with redox concentrations and redox depletions), calcareous silt loam with thin strata of silty clay and silty clay loam and with salt masses in the upper part; light gray (with redox concentrations and redox depletions), calcareous silty clay loam with thin strata of silty clay and silt loam and with salt masses in the lower part

Soil Properties and Qualities

Drainage class: Somewhat poorly drained
Depth to bedrock: Very deep
Depth to contrasting parent material: 40 to more than 60 inches over sandy alluvium
Depth to the water table: 1.5 to 3.0 feet
Flooding: Occasional for brief periods
Ponding: None
Permeability: Moderately slow
Available water capacity: High
Content of organic matter: Moderate
Surface runoff: Low
Other properties: This soil has a high content of lime.

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Chaska soils, which have more sand than the Lamo soil; on high flood plains
• The poorly drained Clamo soils, which have more clay than the Lamo soil and are leached of free carbonates to a depth of 14 to 30 inches; on low flood plains
• The poorly drained Baltic soils on low flood plains
• The moderately well drained Roxbury soils in positions on the landform similar to those of the Lamo soil

Similar inclusions:
• Soils that have salts at or near the surface

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Well suited
Management concerns: Wetness, wind erosion, and the high content of lime, which adversely affects the availability of plant nutrients
Management measures:
• In wet years this soil is better suited to late-planted crops than to other crops. Leaving crop residue on the surface and deferring tillage when the soil is wet help to maintain tilth, help to control wind erosion, and minimize surface compaction.
• Rotations that include grasses and legumes help to control erosion and maintain fertility, tilth, and the content of organic matter.
• Maintaining existing drainage systems helps to remove excess water.

Interpretive Groups

Land capability classification: IIw
Range site: Subirrigated
Windbreak suitability group: 2K
Pasture suitability group: A

Lc—Lamo silty clay loam, 0 to 2 percent slopes, sandy substratum

Composition

Lamo and similar soils: 80 to 90 percent
Contrasting inclusions: 10 to 20 percent

Setting

Landform: Flood plains
Position on the landform: High flood plains
Slope range: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 10 to 500 acres

Typical Profile

Surface layer:
0 to 10 inches—dark gray, calcareous silty clay loam

Subsoil:
10 to 39 inches—grayish brown, calcareous silty clay loam with redox concentrations

Underlying layers:
39 to 47 inches—light brownish gray, calcareous silty clay loam with thin strata of silt loam
47 to 80 inches—pale brown, calcareous, stratified loamy sand and loamy fine sand with redox concentrations and redox depletions

Soil Properties and Qualities

Drainage class: Somewhat poorly drained
Depth to bedrock: Very deep
Depth to contrasting parent material: 40 to 60 inches over sandy alluvium
Depth to the water table: 1.5 to 3.0 feet
Flooding: Occasional for brief periods
Ponding: None
Permeability: Moderately slow in the upper part and rapid in the lower part
Available water capacity: High
Content of organic matter: Moderate
Surface runoff: Low
Other properties: This soil has a high content of lime.

Inclusions

Contrasting inclusions:
• The poorly drained Baltic and Clamo soils, which have more clay than the Lamo soil; on low flood plains
• The somewhat poorly drained Lex soils, which have more sand and less silt than the Lamo soil; in positions on the landform similar to those of the Lamo soil
• The moderately well drained Dalesburg soils, which have more sand than the Lamo soil and are leached of carbonates to a depth of 24 to more than 60 inches; on high flood plains

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Fairly well suited
Management concerns: Wetness, wind erosion, and the high content of lime, which adversely affects the availability of plant nutrients
Management measures:
• In wet years this soil is better suited to late-planted crops than to other crops. Leaving crop residue on the surface and deferring tillage when the soil is wet help to maintain tilth, help to control wind erosion, and minimize surface compaction.
• Rotations that include grasses and legumes help to control erosion and maintain fertility, tilth, and the content of organic matter.
• Maintaining existing drainage systems helps to remove excess water.

Interpretive Groups

Land capability classification: IIIw
Range site: Subirrigated
Windbreak suitability group: 2K
Pasture suitability group: A

Ld—Lamo-Baltic silty clay loams, 0 to 2 percent slopes

Composition

Lamo and similar soils: 55 to 70 percent
Baltic and similar soils: 20 to 30 percent
Contrasting inclusions: 10 to 20 percent

Setting

Landform: Flood plains
Position on the landform: Lamo—high flood plains; Baltic—low flood plains
Slope range: Lamo—0 to 2 percent; Baltic—0 to 1 percent
Shape of areas: Irregular
Size of areas: 10 to 500 acres

Typical Profile

Lamo

Surface layer:
0 to 10 inches—dark gray, calcareous silty clay loam

Subsoil:
10 to 39 inches—grayish brown, calcareous silty clay loam with redox concentrations

Underlying layers:
39 to 58 inches—light brownish gray and grayish brown, calcareous silty clay loam and silty clay with redox concentrations
58 to 80 inches—light grayish brown and grayish brown (with redox concentrations and redox depletions), calcareous silt loam with thin strata of silty clay and silty clay loam and with salt masses in the upper part; light gray (with redox concentrations and redox depletions), calcareous silty clay loam with thin strata of silty clay and silt loam and with salt masses in the lower part

Baltic

Surface soil:
0 to 18 inches—very dark gray, calcareous silty clay loam with oxidized concentrations

Subsoil:
18 to 25 inches—very dark gray, calcareous silty clay loam with masses of gypsum and other salts
25 to 45 inches—very dark gray, calcareous silty clay loam
45 to 56 inches—dark gray, calcareous silty clay loam

Underlying layer:
56 to 80 inches—dark gray, calcareous silty clay loam

Soil Properties and Qualities

Drainage class: Lamo—somewhat poorly drained; Baltic—poorly drained
Depth to bedrock: Very deep
Depth to contrasting parent material: Lamo—40 to more than 60 inches over sandy alluvium; Baltic—more than 60 inches
Water table: Lamo—at a depth of 1.5 to 3.0 feet; Baltic—at the surface to 1.5 feet below the surface
Flooding: Lamo—occasional for long periods; Baltic—occasional for brief periods
Ponding: None
Permeability: Lamo—moderately slow; Baltic—slow
Available water capacity: Lamo—high; Baltic—moderate
Content of organic matter: Lamo—moderate; Baltic—high
Surface runoff: Lamo—low; Baltic—very low
Other properties: Both soils have a high content of lime.

Inclusions

Contrasting inclusions:
- The somewhat poorly drained Chaska soils, which have more sand than the major soils; on high flood plains
- The moderately well drained Roxbury soils on high flood plains
- The somewhat poorly drained Chancellor soils on the lower toeslopes
- The poorly drained Clamo soils, which are leached of free carbonates to a depth of 14 to 30 inches; on low flood plains

Similar inclusions:
- Soils that have salts at or near the surface

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Well suited
Management concerns: Wetness, wind erosion, and the high content of lime, which adversely affects the availability of plant nutrients
Management measures:
- In wet years these soils are better suited to late-planted crops than to other crops. Leaving crop residue on the surface and deferring tillage when the soils are wet help to maintain tilth, help to control wind erosion, and minimize surface compaction.
- Rotations that include grasses and legumes help to

control erosion and maintain fertility, tilth, and the content of organic matter.
• Maintaining existing drainage systems helps to remove excess water.

Interpretive Groups

Land capability classification: Lamo—IIw; Baltic—IIIw
Range site: Lamo—Subirrigated; Baltic—Clayey Overflow
Windbreak suitability group: Lamo—2K; Baltic—2K
Pasture suitability group: Lamo—A; Baltic—A

Le—Lex clay loam, 0 to 2 percent slopes

Composition

Lex and similar soils: 80 to 90 percent
Contrasting inclusions: 10 to 20 percent

Setting

Landform: Flood plains
Position on the landform: High flood plains
Slope range: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 10 to 750 acres

Typical Profile

Surface soil:
0 to 12 inches—very dark gray, calcareous clay loam

Subsoil:
12 to 20 inches—dark gray and dark grayish brown, calcareous loam with redox concentrations

Underlying layers:
20 to 32 inches—grayish brown, calcareous sandy loam with redox concentrations
32 to 80 inches—brown, yellowish brown, and dark yellowish brown, calcareous gravelly loamy sand and gravelly sand with redox concentrations and redox depletions

Soil Properties and Qualities

Drainage class: Somewhat poorly drained
Depth to bedrock: Very deep
Depth to contrasting parent material: 20 to 40 inches over outwash sand and gravel
Depth to the water table: 1.5 to 3.0 feet
Flooding: Occasional for brief periods
Ponding: None
Permeability: Moderate in the upper part and very rapid in the lower part
Available water capacity: High
Content of organic matter: Moderate
Surface runoff: Low
Other properties: This soil has a high content of lime.

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Lamo soils that have a sandy substratum, which have more silt and less sand above the sandy underlying material than the Lex soil; in positions on the landform similar to those of the Lex soil
• The somewhat poorly drained Dimo soils, which are leached of carbonates to a depth of 20 to 40 inches; in positions on the landform similar to those of the Lex soil
• The moderately well drained Dalesburg soils, which are leached of carbonates to a depth of 24 to more than 60 inches; on high flood plains

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Fairly well suited
Management concerns: Wetness, wind erosion, and the high content of lime, which adversely affects the availability of plant nutrients
Management measures:
• In wet years this soil is better suited to late-planted crops than to other crops. Leaving crop residue on the surface and deferring tillage when the soil is wet help to maintain tilth, help to control wind erosion, and minimize surface compaction.
• Rotations that include grasses and legumes help to control erosion and maintain fertility, tilth, and the content of organic matter.
• Maintaining existing drainage systems helps to remove excess water.

Interpretive Groups

Land capability classification: IIIw
Range site: Subirrigated
Windbreak suitability group: 2K
Pasture suitability group: A

Lg—Lossing silty clay, 0 to 2 percent slopes

Composition

Lossing and similar soils: 75 to 85 percent
Contrasting inclusions: 15 to 25 percent

Setting

Landform: Flood plains
Position on the landform: Valley flats
Slope range: 0 to 2 percent

Shape of areas: Irregular
Size of areas: 10 to 250 acres

Typical Profile

Surface layer:
0 to 8 inches—dark grayish brown silty clay

Subsoil:
8 to 13 inches—grayish brown, calcareous silty clay with redox concentrations

Underlying layers:
13 to 72 inches—grayish brown and light brownish gray (with redox concentrations), calcareous silty clay loam with thin strata of silt loam and silty clay in the upper part; silt loam with thin strata of fine sandy loam, silty clay loam, and silty clay in the lower part
72 to 80 inches—olive gray and gray, calcareous silty clay with redox concentrations

Soil Properties and Qualities

Drainage class: Moderately well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: 6 to 20 inches over loamy alluvium
Depth to the water table: 3 to 5 feet
Flooding: Very rare
Ponding: None
Permeability: Slow
Available water capacity: High
Content of organic matter: Moderate
Surface runoff: Low

Inclusions

Contrasting inclusions:
• The moderately well drained Percival and Scroll soils, which have sandy material above a depth of 40 inches; in positions on the landform similar to those of the Lossing soil
• The well drained Haynie soils on valley flats
• The moderately well drained Blake soils on valley flats

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Well suited
Management concerns: Conserving moisture
Management measures:
• Crop residue management conserves moisture and helps to maintain tilth and the content of organic matter.

Interpretive Groups

Land capability classification: I
Range site: Clayey Overflow
Windbreak suitability group: 1K
Pasture suitability group: I

Lo—Lossing-Owego silty clays, 0 to 2 percent slopes

Composition

Lossing and similar soils: 45 to 55 percent
Owego and similar soils: 25 to 35 percent
Contrasting inclusions: 10 to 25 percent

Setting

Landform: Flood plains
Position on the landform: Valley flats
Slope range: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 20 to 500 acres

Typical Profile

Lossing

Surface layer:
0 to 8 inches—dark grayish brown silty clay

Subsoil:
8 to 13 inches—grayish brown, calcareous silty clay with redox concentrations

Underlying layers:
13 to 72 inches—grayish brown and light brownish gray (with redox concentrations), calcareous silty clay loam with thin strata of silt loam and silty clay in the upper part; silt loam with thin strata of fine sandy loam, silty clay loam, and silty clay in the lower part
72 to 80 inches—olive gray and gray, calcareous silty clay with redox concentrations

Owego

Surface layer:
0 to 9 inches—dark grayish brown silty clay

Underlying layers:
9 to 16 inches—olive gray silty clay with redox concentrations
16 to 24 inches—light olive gray and pale olive (with redox concentrations), calcareous silt loam with thin strata of silty clay loam and silty clay
24 to 68 inches—dark gray, calcareous silty clay with redox concentrations and redox depletions

68 to 80 inches—light olive gray (with redox concentrations and redox depletions), calcareous silt loam with thin strata of silty clay loam and silty clay

Soil Properties and Qualities

Drainage class: Lossing—moderately well drained; Owego—somewhat poorly drained
Depth to bedrock: Very deep
Depth to contrasting parent material: Lossing—6 to 20 inches over loamy alluvium; Owego—more than 60 inches
Depth to the water table: Lossing—3 to 5 feet; Owego—1.5 to 3.0 feet
Flooding: Very rare
Ponding: None
Permeability: Lossing—slow; Owego—very slow
Available water capacity: Lossing—high; Owego—moderate
Content of organic matter: Moderate
Surface runoff: Low

Inclusions

Contrasting inclusions:
• The moderately well drained Onawa soils, which have thicker clayey material than the Lossing soil; in positions on the landform similar to those of the Lossing and Owego soils
• The somewhat poorly drained Forney soils, which are clayey throughout; in positions on the landform similar to those of the Lossing and Owego soils
• The moderately well drained Blake soils on valley flats
• The well drained Haynie soils on valley flats

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Well suited
Management concerns: Lossing—conserving moisture; Owego—wetness
Management measures:
• Minimizing tillage and leaving crop residue on the surface conserve moisture and help to control erosion.
• In wet years the Owego soil is better suited to late-planted crops than to other crops. Leaving crop residue on the surface and deferring tillage when the soil is wet help to maintain tilth and minimize surface compaction.
• Rotations that include grasses and legumes help to control erosion and maintain fertility, tilth, and the content of organic matter.

Interpretive Groups

Land capability classification: Lossing—I; Owego—IIw
Range site: Lossing—Clayey Overflow; Owego—Clayey Overflow
Windbreak suitability group: Lossing—1K; Owego—1
Pasture suitability group: Lossing—I; Owego—A

Lr—Lossing-Vore silty clays, 0 to 2 percent slopes

Composition

Lossing and similar soils: 45 to 60 percent
Vore and similar soils: 20 to 35 percent
Contrasting inclusions: 5 to 25 percent

Setting

Landform: Flood plains
Position on the landform: Valley flats
Slope range: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 25 to 1,500 acres

Typical Profile

Lossing

Surface layer:
0 to 8 inches—dark grayish brown silty clay

Subsoil:
8 to 13 inches—grayish brown, calcareous silty clay with redox concentrations

Underlying layers:
13 to 72 inches—grayish brown and light brownish gray (with redox concentrations), calcareous silty clay loam with thin strata of silt loam and silty clay in the upper part; silt loam with thin strata of fine sandy loam, silty clay loam, and silty clay in the lower part
72 to 80 inches—olive gray and gray, calcareous silty clay with redox concentrations

Vore

Surface layer:
0 to 8 inches—grayish brown, calcareous silty clay

Underlying layers:
8 to 23 inches—light brownish gray (with redox concentrations), calcareous silty clay loam with thin strata of silt loam and silty clay
23 to 80 inches—light brownish gray (with redox concentrations), calcareous loamy fine sand and fine sand

Soil Properties and Qualities

Drainage class: Moderately well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: Lossing—6 to 20 inches over loamy alluvium; Vore—15 to 30 inches over sandy alluvium
Depth to the water table: 3 to 5 feet
Flooding: Very rare
Ponding: None
Permeability: Lossing—slow; Vore—moderate in the upper part and rapid in the lower part
Available water capacity: Lossing—high; Vore—moderate
Content of organic matter: Moderate
Surface runoff: Low

Inclusions

Contrasting inclusions:
- The well drained Haynie soils on valley flats
- The moderately well drained Onawa soils, which have thicker clayey material in the upper part than the Lossing soil; in positions on the landform similar to those of the Lossing and Vore soils
- The moderately well drained Scroll soils, which have sandy material at a depth of 10 to 15 inches; on valley flats
- The moderately well drained Modale soils, which have clayey material at a depth of 18 to 30 inches; on valley flats

Use and Management

Cropland

Main crops: Alfalfa, corn, and soybeans
Suitability for crops: Well suited
Management concerns: Lossing—conserving moisture; Vore—limited available water capacity
Management measures:
- Minimizing tillage and leaving crop residue on the surface conserve moisture and help to control erosion.
- Irrigation helps to overcome the limited available water capacity if the quantity and quality of the water are adequate.
- Rotations that include grasses and legumes help to control erosion and maintain fertility, tilth, and the content of organic matter.

Interpretive Groups

Land capability classification: Lossing—I; Vore—IIs
Range site: Lossing—Clayey Overflow; Vore—Clayey Overflow
Windbreak suitability group: Lossing—1K; Vore—1K
Pasture suitability group: Lossing—I; Vore—I

Lt—Luton silty clay, 0 to 2 percent slopes, occasionally flooded

Composition

Luton and similar soils: 80 to 95 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Flood plains
Position on the landform: Low flood plains
Slope range: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 25 to 1,000 acres

Typical Profile

Surface soil:
0 to 16 inches—very dark gray silty clay

Subsoil:
16 to 26 inches—very dark gray silty clay
26 to 33 inches—very dark gray silty clay with slickensides
33 to 58 inches—gray (with redox concentrations) silty clay with slickensides
58 to 80 inches—gray (with redox concentrations), calcareous silty clay with slickensides

Soil Properties and Qualities

Drainage class: Poorly drained
Depth to bedrock: Very deep
Depth to contrasting parent material: More than 60 inches
Water table: At the surface to 1 foot below the surface
Flooding: Occasional for long periods
Ponding: None
Permeability: Very slow
Available water capacity: Moderate
Content of organic matter: Moderate
Surface runoff: Very low

Inclusions

Contrasting inclusions:
- The somewhat poorly drained Lamo soils, which have less clay than the Luton soil; on high flood plains
- The poorly drained Baltic soils, which have free carbonates at or near the surface; on low flood plains
- The poorly drained Clamo soils on low flood plains

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Poorly suited

Management concerns: Wetness
Management measures:
• In most years this soil is better suited to late-planted crops than to other crops. Leaving crop residue on the surface and deferring tillage when the soil is wet help to maintain tilth and minimize surface compaction.
• Rotations that include grasses and legumes help to control erosion and maintain fertility, tilth, and the content of organic matter.
• Maintaining existing drainage systems helps to remove excess water.

Interpretive Groups

Land capability classification: IVw
Range site: Clayey Overflow
Windbreak suitability group: 2
Pasture suitability group: B1

Lu—Luton silty clay, 0 to 2 percent slopes, rarely flooded

Composition

Luton and similar soils: 80 to 95 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Flood plains
Position on the landform: Backswamps
Slope range: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 25 to 2,500 acres

Typical Profile

Surface soil:
0 to 16 inches—very dark gray silty clay

Subsoil:
16 to 26 inches—very dark gray silty clay
26 to 33 inches—very dark gray silty clay with slickensides
33 to 58 inches—gray (with redox concentrations) silty clay with slickensides
58 to 80 inches—gray (with redox concentrations), calcareous silty clay with slickensides

Soil Properties and Qualities

Drainage class: Poorly drained
Depth to bedrock: Very deep
Depth to contrasting parent material: More than 60 inches
Water table: At the surface to 1 foot below the surface
Flooding: Rare
Ponding: None
Permeability: Very slow
Available water capacity: Moderate
Content of organic matter: Moderate
Surface runoff: Very low

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Blencoe soils in the slightly higher positions on the landform
• The poorly drained Napa soils, which have features associated with a high content of sodium; in positions on the landform similar to those of the Luton soil
• The poorly drained Baltic soils, which have carbonates at or near the surface; on low flood plains
• The poorly drained James soils, which have salts and carbonates at or near the surface; on low flood plains

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Poorly suited
Management concerns: Wetness
Management measures:
• In most years this soil is better suited to late-planted crops than to other crops. Leaving crop residue on the surface and deferring tillage when the soil is wet help to maintain tilth and minimize surface compaction.
• Rotations that include grasses and legumes help to control erosion and maintain fertility, tilth, and the content of organic matter.
• Maintaining existing drainage systems helps to remove excess water.

Interpretive Groups

Land capability classification: IVw
Range site: Clayey Overflow
Windbreak suitability group: 2
Pasture suitability group: B1

McA—Meckling loamy fine sand, 0 to 4 percent slopes

Composition

Meckling and similar soils: 75 to 95 percent
Contrasting inclusions: 5 to 25 percent

Setting

Landform: Flood plains
Position on the landform: Meander belts
Slope range: 0 to 4 percent

Shape of areas: Irregular
Size of areas: 25 to 1,500 acres

Typical Profile

Surface layer:
0 to 6 inches—grayish brown, calcareous loamy fine sand

Underlying layers:
6 to 16 inches—light brownish gray (with redox concentrations and redox depletions), calcareous fine sand with thin strata of very fine sand, silty clay loam, and silty clay
16 to 37 inches—light brownish gray (with redox concentrations and redox depletions), calcareous very fine sand with thin strata of very fine sandy loam, loamy very fine sand, and fine sand
37 to 54 inches—light brownish gray (with redox concentrations and redox depletions), calcareous fine sand with thin strata of very fine sand, loamy very fine sand, and very fine sandy loam
54 to 80 inches—light brownish gray, stratified sand, fine sand, and very fine sand with redox concentrations and redox depletions

Soil Properties and Qualities

Drainage class: Moderately well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: More than 60 inches
Depth to the water table: 2.5 to 4.0 feet
Flooding: Rare
Ponding: None
Permeability: Rapid
Available water capacity: Low
Content of organic matter: Moderately low
Surface runoff: Low

Inclusions

Contrasting inclusions:
- The poorly drained Norway soils on low flood plains
- The excessively drained Sardak soils on valley flats
- The well drained Grable soils, which have less sand and more silt and clay in the upper part than the Meckling soil; on valley flats
- The moderately well drained Scroll soils, which have a clayey surface layer; on valley flats

Use and Management

Cropland and pasture

Main crops: Alfalfa, corn, oats, and soybeans in leveled and irrigated areas; not generally suited to crops in other areas
Suitability for crops: Poorly suited
Management concerns: Limited available water capacity, wind erosion
Management measures:
- Minimizing tillage and leaving crop residue on the surface conserve moisture and help to control erosion.
- Rotations that include grasses and legumes help to control erosion and maintain fertility, tilth, and the content of organic matter.
- Stripcropping and field windbreaks help to control wind erosion.
- Irrigation helps to overcome the limited available water capacity if the quantity and quality of the water are adequate.
- Proper grazing management helps to maintain plant vigor and helps to control wind erosion.

Interpretive Groups

Land capability classification: IVs
Range site: Subirrigated
Windbreak suitability group: 1K
Pasture suitability group: H

Mo—Modale silt loam, 0 to 2 percent slopes

Composition

Modale and similar soils: 75 to 90 percent
Contrasting inclusions: 10 to 25 percent

Setting

Landform: Flood plains
Position on the landform: Valley flats
Slope range: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 5 to 100 acres

Typical Profile

Surface layer:
0 to 8 inches—dark grayish brown, calcareous silt loam

Underlying layers:
8 to 25 inches—light brownish gray (with redox concentrations), calcareous silt loam with thin strata of very fine sandy loam and silty clay loam
25 to 70 inches—grayish brown (with redox concentrations), calcareous silty clay
70 to 80 inches—light brownish gray and grayish brown (with redox concentrations), calcareous silty clay loam with thin strata of silt loam and silty clay

Soil Properties and Qualities

Drainage class: Moderately well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: 18 to 30 inches over clayey alluvium
Depth to the water table: 3 to 5 feet
Flooding: Very rare
Ponding: None
Permeability: Moderate in the upper part and very slow in the lower part
Available water capacity: High
Content of organic matter: Moderately low
Surface runoff: Low

Inclusions

Contrasting inclusions:
- The well drained Haynie soils, which do not have clayey material above a depth of 40 inches; in positions on the landform similar to those of the Modale soil
- The moderately well drained Blake soils, which do not have clayey material above a depth of 40 inches; in positions on the landform similar to those of the Modale soil
- The well drained Grable soils, which have sandy material at a depth of 18 to 30 inches; in positions on the landform similar to those of the Modale soil
- The moderately well drained Lossing soils, which have a clayey surface layer; on valley flats

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Well suited
Management concerns: Conserving moisture
Management measures:
- Crop residue management conserves moisture and helps to maintain tilth and the content of organic matter.

Interpretive Groups

Land capability classification: I
Range site: Silty
Windbreak suitability group: 1K
Pasture suitability group: F

Na—Napa-Luton complex, 0 to 2 percent slopes

Composition

Napa and similar soils: 45 to 55 percent
Luton and similar soils: 25 to 40 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Flood plains
Position on the landform: Backswamps
Slope range: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 25 to 2,000 acres

Typical Profile

Napa

Surface layer:
0 to 0.5 inch—dark gray silt loam

Subsoil:
0.5 inch to 17 inches—dark gray silty clay with nests of gypsum and threads of salt
17 to 33 inches—dark gray and gray, calcareous silty clay with redox concentrations; nests of gypsum and threads of salt
33 to 66 inches—gray, calcareous silty clay with redox concentrations; nests of gypsum and other salts and slickensides

Underlying layer:
66 to 80 inches—dark gray, calcareous silty clay with redox concentrations; nests of gypsum and slickensides

Luton

Surface layer:
0 to 16 inches—very dark gray silty clay

Subsoil:
16 to 26 inches—very dark gray silty clay
26 to 33 inches—very dark gray silty clay with slickensides
33 to 58 inches—gray (with redox concentrations) silty clay with slickensides
58 to 80 inches—gray (with redox concentrations), calcareous silty clay with slickensides

Soil Properties and Qualities

Drainage class: Poorly drained
Depth to bedrock: Very deep
Depth to contrasting parent material: More than 60 inches
Water table: Napa—at the surface to 3 feet below the surface; Luton—at the surface to 1 foot below the surface
Flooding: Rare
Ponding: None
Permeability: Very slow
Available water capacity: Moderate
Content of organic matter: Moderate

Surface runoff: Very low
Other properties: A sodium-affected subsoil restricts root penetration and the rate of water infiltration in the Napa soil.

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Gayville soils on valley flats
• The somewhat poorly drained Blencoe soils, which have a loamy underlying layer; in the slightly higher positions on the landform

Use and Management

Pasture and rangeland

Suitability for crops: Generally unsuited
Management concerns: Napa—wetness, high content of salt; Luton—wetness
Management measures:
• Areas of this unit can be used as pasture or range (fig. 16) or as wildlife habitat. Proper grazing management helps to maintain plant vigor.

Interpretive Groups

Land capability classification: Napa—VIs; Luton—IVw
Range site: Napa—Saline Lowland; Luton—Clayey Overflow
Windbreak suitability group: Napa—10; Luton—2
Pasture suitability group: Napa—NS; Luton—B1

Nb—Norway loamy fine sand, 0 to 4 percent slopes

Composition

Norway and similar soils: 80 to 90 percent
Contrasting inclusions: 10 to 20 percent

Setting

Landform: Flood plains
Position on the landform: Meander channels or islands (fig. 17)
Slope range: 0 to 4 percent
Shape of areas: Irregular
Size of areas: 25 to 250 acres

Typical Profile

Surface layer:
0 to 2 inches—grayish brown, calcareous loamy fine sand with redox concentrations and redox depletions

Underlying layers:
2 to 10 inches—light brownish gray, calcareous fine sand with redox concentrations
10 to 80 inches—light olive gray, calcareous, stratified fine sand and very fine sand with redox concentrations

Soil Properties and Qualities

Drainage class: Very poorly drained
Depth to bedrock: Very deep
Depth to contrasting parent material: More than 60 inches
Water table: At the surface to 1 foot below the surface
Flooding: Frequent for long periods
Ponding: None
Permeability: Rapid
Available water capacity: Low
Content of organic matter: Low
Surface runoff: Very low
Other features: Areas of this soil typically are dissected by meandering channels.

Inclusions

Contrasting inclusions:
• The moderately well drained Meckling soils on meander belts
• The excessively drained Sardak soils on valley flats
• The well drained Grable soils, which have less sand and more silt and clay in the upper part than the Norway soil; on valley flats
• The moderately well drained Scroll soils, which have a clayey surface layer; on valley flats

Use and Management

Wildlife habitat

Suitability for crops: Not suited
Management concerns: Limited accessibility, flooding

Interpretive Groups

Land capability classification: VIIIw
Range site: Not assigned
Windbreak suitability group: 10
Pasture suitability group: NS

NcA—Norway-Meckling loamy fine sands, 0 to 4 percent slopes

Composition

Norway and similar soils: 40 to 55 percent
Meckling and similar soils: 35 to 45 percent
Contrasting inclusions: 0 to 20 percent

Setting

Landform: Flood plains (fig. 17)
Position on the landform: Norway—meander channels or islands; Meckling—meander belts
Slope range: Norway—0 to 2 percent; Meckling—0 to 4 percent
Shape of areas: Irregular
Size of areas: 50 to 1,500 acres

Typical Profile

Norway

Surface layer:
0 to 2 inches—grayish brown, calcareous loamy fine sand with redox concentrations and redox depletions

Underlying layers:
2 to 10 inches—light brownish gray, calcareous fine sand with redox concentrations
10 to 80 inches—light olive gray, calcareous, stratified fine sand and very fine sand with redox concentrations

Meckling

Surface layer:
0 to 6 inches—grayish brown, calcareous loamy fine sand

Underlying layers:
6 to 16 inches—light brownish gray (with redox concentrations and redox depletions), calcareous fine sand with thin strata of very fine sand, silty clay loam, and silty clay
16 to 37 inches—light brownish gray (with redox concentrations and redox depletions), calcareous very fine sand with thin strata of very fine sandy loam, loamy very fine sand, and fine sand
37 to 54 inches—light brownish gray (with redox concentrations and redox depletions), calcareous fine sand with thin strata of very fine sand, loamy very fine sand, and very fine sandy loam
54 to 80 inches—light brownish gray, stratified sand, fine sand, and very fine sand with redox concentrations and redox depletions

Soil Properties and Qualities

Drainage class: Norway—poorly drained; Meckling—moderately well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: More than 60 inches
Water table: Norway—at the surface to 1.5 feet below the surface; Meckling—at a depth of 2.5 to 4.0 feet
Flooding: Norway—occasional for long periods; Meckling—rare
Ponding: None
Permeability: Rapid
Available water capacity: Low
Content of organic matter: Norway—low; Meckling—moderately low
Surface runoff: Norway—very low; Meckling—low
Other features: The Norway soil typically is in meandering channels that dissect areas of the Meckling soil.

Inclusions

Contrasting inclusions:
• The excessively drained Sardak soils on valley flats
• The well drained Grable soils, which have less sand and more silt and clay in the upper part than the major soils; on valley flats
• The moderately well drained Scroll soils, which have a clayey surface layer; on valley flats

Use and Management

Wildlife habitat and rangeland

Suitability for crops: Not suited; most areas have wide channels that are too deep or too wet to be crossed with tillage equipment.
Management concerns: Norway—wetness, wind erosion; Meckling—wind erosion, low available water capacity
Management considerations:
• Most areas of this unit are islands in the Missouri River channel or are along the edge of the Missouri River.
• Proper grazing management helps to maintain plant vigor and helps to control wind erosion.

Interpretive Groups

Land capability classification: Norway—VIw; Meckling—IVs
Range site: Norway—Not assigned; Meckling—Subirrigated
Windbreak suitability group: Norway—10; Meckling—1K
Pasture suitability group: Norway—NS; Meckling—H

Oa—Onawa silty clay, 0 to 2 percent slopes

Composition

Onawa and similar soils: 80 to 90 percent
Contrasting inclusions: 10 to 20 percent

Setting

Landform: Flood plains
Position on the landform: Valley flats
Slope range: 0 to 2 percent
Shape of areas: Elongated
Size of areas: 10 to 500 acres

Typical Profile

Surface layer:
0 to 7 inches—dark grayish brown, calcareous silty clay

Underlying layers:
7 to 25 inches—grayish brown, calcareous silty clay with redox concentrations
25 to 47 inches—light brownish gray (with redox concentrations), calcareous silt loam with thin strata of very fine sandy loam and silty clay loam
47 to 70 inches—light brownish gray (with redox concentrations), calcareous very fine sandy loam with thin strata of silt loam and silty clay loam
70 to 80 inches—light brownish gray (with redox concentrations), calcareous loamy very fine sand with thin strata of very fine sandy loam and silt loam

Soil Properties and Qualities

Drainage class: Moderately well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: 18 to 30 inches over loamy alluvium
Depth to the water table: 3 to 5 feet
Flooding: Very rare
Ponding: None
Permeability: Slow
Available water capacity: High
Content of organic matter: Moderate
Surface runoff: Low

Inclusions

Contrasting inclusions:
- The moderately well drained Lossing soils, which have thinner clayey material in the upper part of the profile than the Onawa soil; in positions on the landform similar to those of the Onawa soil
- The moderately well drained Vore soils, which have sandy underlying material; in positions on the landform similar to those of the Onawa soil
- The well drained Haynie soils on valley flats
- The moderately well drained Blake soils on valley flats

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Well suited
Management concerns: Limited available water capacity
Management measures:
- This soil is better suited to early maturing crops than to other crops. Minimizing tillage and leaving crop residue on the surface conserve moisture and help to control erosion.
- Rotations that include grasses and legumes help to control erosion and maintain fertility, tilth, and the content of organic matter.

Interpretive Groups

Land capability classification: IIs
Range site: Clayey Overflow
Windbreak suitability group: 1K
Pasture suitability group: I

Ob—Onawa-Owego silty clays, 0 to 2 percent slopes

Composition

Onawa and similar soils: 45 to 55 percent
Owego and similar soils: 25 to 35 percent
Contrasting inclusions: 10 to 25 percent

Setting

Landform: Flood plains
Position on the landform: Valley flats
Slope range: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 20 to 500 acres

Typical Profile

Onawa

Surface layer:
0 to 7 inches—dark grayish brown, calcareous silty clay

Underlying layers:
7 to 25 inches—grayish brown, calcareous silty clay with redox concentrations
25 to 47 inches—light brownish gray (with redox concentrations), calcareous silt loam with thin strata of very fine sandy loam and silty clay loam
47 to 70 inches—light brownish gray (with redox

concentrations), calcareous very fine sandy loam with thin strata of silt loam and silty clay loam
70 to 80 inches—light brownish gray (with redox concentrations), calcareous loamy very fine sand with thin strata of very fine sandy loam and silt loam

Owego

Surface layer:
0 to 9 inches—dark grayish brown silty clay

Underlying layers:
9 to 16 inches—olive gray silty clay with redox concentrations
16 to 24 inches—light olive gray and pale olive (with redox concentrations), calcareous silt loam with thin strata of silty clay loam and silty clay
24 to 68 inches—dark gray, calcareous silty clay with redox concentrations and redox depletions
68 to 80 inches—light olive gray (with redox concentrations and redox depletions), calcareous silt loam with thin strata of silty clay loam and silty clay

Soil Properties and Qualities

Drainage class: Onawa—moderately well drained; Owego—somewhat poorly drained
Depth to bedrock: Very deep
Depth to contrasting parent material: Onawa—18 to 30 inches over loamy alluvium; Owego—more than 60 inches
Depth to the water table: Onawa—3 to 5 feet; Owego—1.5 to 3.0 feet
Flooding: Very rare
Ponding: None
Permeability: Onawa—slow; Owego—very slow
Available water capacity: Onawa—high; Owego—moderate
Content of organic matter: Moderate
Surface runoff: Low

Inclusions

Contrasting inclusions:
• The moderately well drained Lossing soils, which have thinner clayey material than the Onawa soil; in positions on the landscape similar to those of the Onawa soil
• The somewhat poorly drained Forney soils, which are clayey throughout; in positions on the landform similar to those of the Onawa and Owego soils
• The moderately well drained Blake soils on valley flats
• The well drained Haynie soils on valley flats

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Not suited
Management concerns: Onawa—limited available water capacity; Owego—wetness
Management measures:
• The Onawa soil is better suited to early maturing crops than to other crops. Minimizing tillage and leaving crop residue on the surface conserve moisture and help to control erosion. Rotations that include grasses and legumes help to control erosion and maintain fertility, tilth, and the content of organic matter.
• In wet years the Owego soil is better suited to late-planted crops than to other crops. Leaving crop residue on the surface and deferring tillage when the soil is wet help to maintain tilth and minimize surface compaction.

Interpretive Groups

Land capability classification: Onawa—IIs; Owego—IIw
Range site: Onawa—Clayey Overflow; Owego—Clayey Overflow
Windbreak suitability group: Onawa—1K; Owego—1
Pasture suitability group: Onawa—I; Owego—A

Oc—Orthents, channelized

Composition

Orthents and similar soils: 80 to 100 percent
Contrasting inclusions: 0 to 20 percent

Setting

Landform: Flood plains
Position on the landform: Low flood plains
Slope range: 0 to 40 percent
Shape of areas: Elongated
Size of areas: 20 to 1,000 acres

Soil Properties and Qualities

Drainage class: Moderately well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: More than 60 inches
Depth to the water table: 3 to 6 feet
Flooding: Frequent for long periods
Ponding: None
Permeability: Moderate

Available water capacity: Moderate
Content of organic matter: Moderate
Surface runoff: High
Other features: This map unit consists of areas where major streams and rivers have been straightened and diked. The soils have been disturbed during the construction of dikes, and open water is in the channelized areas.

Inclusions

Contrasting inclusions:
- The somewhat poorly drained Chaska and Lamo soils on high flood plains
- The poorly drained Baltic and Luton soils on low flood plains

Use and Management

Wildlife habitat and rangeland

Suitability for crops: Not suited
Management concerns: Frequent flooding
Management measures:
- Proper grazing management helps to maintain plant vigor.

Interpretive Groups

Land capability classification: VIIIs
Range site: Not assigned
Windbreak suitability group: 10
Pasture suitability group: NS

Og—Orthents, gravelly

Composition

Orthents and similar soils: 85 to 100 percent
Contrasting inclusions: 0 to 15 percent

Setting

Landform: Outwash plains or flood plains
Position on the landform: Backslopes or high flood plains
Slope range: 0 to 15 percent
Shape of areas: Irregular
Size of areas: 5 to 150 acres

Soil Properties and Qualities

Drainage class: Excessively drained
Depth to bedrock: Very deep
Depth to contrasting parent material: More than 60 inches
Depth to the water table: More than 6 feet
Flooding: None
Ponding: None
Permeability: Rapid
Available water capacity: Low
Content of organic matter: Low
Surface runoff: Low
Other features: This map unit consists of areas where the soils have been disturbed during the removal of gravelly material.

Inclusions

Contrasting inclusions:
- The excessively drained Talmo soils on shoulder slopes
- The somewhat excessively drained Delmont soils on backslopes
- The well drained Ethan soils, which do not have gravelly underlying material; on shoulder slopes
- The well drained Enet soils that are subject to rare flooding; on high flood plains

Use and Management

Construction materials and wildlife habitat

Management concerns: Limited available water capacity
Management considerations:
- Most areas of this unit are gravel pits used mainly as a source of gravel for construction purposes. Some areas provide limited wildlife habitat. Abandoned gravel pits can be restored to range, tame pasture, or cropland if reclamation measures are applied.
- Shaping the areas helps to overcome the slope. The mounds of overburden material can be used as topsoil dressing.
- Proper grazing management helps to maintain plant vigor, conserves moisture, and helps to control erosion.
- Applications of fertilizer can help to establish range or pasture plantings.

Interpretive Groups

Land capability classification: VIIIs
Range site: Not assigned
Windbreak suitability group: 10
Pasture suitability group: NS

Om—Orthents, loamy

Composition

Orthents and similar soils: 85 to 100 percent
Contrasting inclusions: 0 to 15 percent

Setting

Landform: Flood plains or till plains
Position on the landform: Valley flats
Slope range: 0 to 15 percent

Shape of areas: Irregular
Size of areas: 20 to 400 acres

Soil Properties and Qualities

Drainage class: Well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: 20 to more than 60 inches over clayey alluvium
Depth to the water table: More than 6 feet
Flooding: None
Ponding: None
Permeability: Moderate
Available water capacity: Moderate
Content of organic matter: Moderately low
Surface runoff: Medium
Other features: This map unit consists of areas where the soils have been disturbed during the removal or buildup of loamy material.

Inclusions

Contrasting inclusions:
- The poorly drained Luton soils, which are clayey throughout; on low flood plains
- The poorly drained Albaton soils, which are clayey throughout; on valley flats
- The well drained Egan soils on backslopes on till plains

Use and Management

Pasture, rangeland, or wildlife habitat

Suitability for crops: Not suited
Management concerns: Wetness, wind erosion
Management measures:
- Land shaping can help to overcome the slope. The mounds of overburden material can be used as topsoil dressing.
- Proper grazing management helps to maintain plant vigor, conserves moisture, and helps to control erosion.
- Applications of fertilizer can help to establish pasture plantings.

Interpretive Groups

Land capability classification: VIe
Range site: Thin Upland
Windbreak suitability group: 8
Pasture suitability group: G

Os—Orthents, sandy

Composition

Orthents and similar soils: 85 to 100 percent
Contrasting inclusions: 0 to 15 percent

Setting

Landform: Flood plains
Position on the landform: Valley flats
Slope range: 0 to 15 percent
Shape of areas: Irregular
Size of areas: 5 to 50 acres

Soil Properties and Qualities

Drainage class: Excessively drained
Depth to bedrock: Very deep
Depth to contrasting parent material: More than 60 inches
Depth to the water table: More than 6 feet
Flooding: None
Ponding: None
Permeability: Rapid
Available water capacity: Low
Content of organic matter: Low
Surface runoff: Low
Other features: This map unit consists of areas where the soils have been disturbed during the removal of sandy material.

Inclusions

Contrasting inclusions:
- The excessively drained Sardak soils in positions on the landform similar to those of the major soils
- The well drained Grable and Ticonic soils in positions on the landform similar to those of the major soils

Use and Management

Construction materials

Management concerns: Limited available water capacity
Management considerations:
- Most areas of this unit are sand pits used mainly as a source of sand for construction purposes. Some areas provide limited wildlife habitat. Abandoned pits can be restored to range, tame pasture, or cropland if reclamation measures are applied.

Management measures:
- Land shaping helps to overcome the slope. The mounds of overburden material can be used as topsoil dressing.
- Proper grazing management helps to maintain plant vigor, conserves moisture, and helps to control erosion.
- Applications of fertilizer can help to establish range or pasture plantings.

Interpretive Groups

Land capability classification: VIIIs

Range site: Not assigned
Windbreak suitability group: 10
Pasture suitability group: NS

Ow—Owego silty clay, 0 to 2 percent slopes

Composition

Owego and similar soils: 75 to 90 percent
Contrasting inclusions: 10 to 25 percent

Setting

Landform: Flood plains
Position on the landform: Valley flats
Slope range: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 10 to 500 acres

Typical Profile

Surface layer:
0 to 9 inches—dark grayish brown silty clay

Underlying layers:
9 to 16 inches—olive gray silty clay with redox concentrations
16 to 24 inches—light olive gray and pale olive (with redox concentrations), calcareous silt loam with thin strata of silty clay loam and silty clay
24 to 68 inches—dark gray, calcareous silty clay with redox concentrations and redox depletions
68 to 80 inches—light olive gray (with redox concentrations and redox depletions), calcareous silt loam with thin strata of silty clay loam and silty clay

Soil Properties and Qualities

Drainage class: Somewhat poorly drained
Depth to bedrock: Very deep
Depth to contrasting parent material: More than 60 inches
Depth to the water table: 1.5 to 3.0 feet
Flooding: Very rare
Ponding: None
Permeability: Very slow
Available water capacity: Moderate
Content of organic matter: Moderate
Surface runoff: Low

Inclusions

Contrasting inclusions:
• The poorly drained Albaton soils, which do not have a layer of loamy material above a depth of 24 inches; in positions on the landform similar to those of the Owego soil
• The moderately well drained Lossing and Onawa soils, which have loamy underlying material; in the slightly higher positions on the landform
• The moderately well drained Blake soils on valley flats

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Well suited
Management concerns: Wetness
Management measures:
• In wet years this soil is better suited to late-planted crops than to other crops. Leaving crop residue on the surface and deferring tillage when the soil is wet help to maintain tilth and minimize surface compaction.
• Rotations that include grasses and legumes help to control erosion and maintain fertility, tilth, and the content of organic matter.
• Maintaining existing drainage systems helps to remove excess water.

Interpretive Groups

Land capability classification: IIw
Range site: Clayey Overflow
Windbreak suitability group: 1
Pasture suitability group: A

Pe—Percival silty clay, 0 to 2 percent slopes

Composition

Percival and similar soils: 80 to 90 percent
Contrasting inclusions: 10 to 20 percent

Setting

Landform: Flood plains
Position on the landform: Valley flats
Slope range: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 10 to 200 acres

Typical Profile

Surface layer:
0 to 7 inches—dark grayish brown, calcareous silty clay

Underlying layers:
7 to 25 inches—grayish brown, calcareous silty clay with redox concentrations
25 to 74 inches—light brownish gray and grayish brown, calcareous, stratified fine sand and loamy fine sand with redox concentrations

Soil Properties and Qualities

Drainage class: Moderately well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: 15 to 30 inches over sandy alluvium
Depth to the water table: 3 to 5 feet
Flooding: Very rare
Ponding: None
Permeability: Slow
Available water capacity: Low
Content of organic matter: Moderately low
Surface runoff: Low

Inclusions

Contrasting inclusions:
• The moderately well drained Scroll soils, which have sandy underlying material at a depth of 10 to 15 inches; in positions on the landform similar to those of the Percival soil
• The moderately well drained Vore soils, which have thinner clayey material in the upper part than the Percival soil; in positions on the landform similar to those of the Percival soil
• The moderately well drained Onawa soils, which do not have sandy material above a depth of 40 inches; in positions on the landform similar to those of the Percival soil
• The well drained Grable soils on valley flats

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Well suited
Management concerns: Limited available water capacity
Management measures:
• This soil is better suited to early maturing crops than to other crops. Minimizing tillage and leaving crop residue on the surface conserve moisture and help to control erosion.
• Irrigation helps to overcome the limited available water capacity if the quantity and quality of the water are adequate.
• Rotations that include grasses and legumes help to control erosion and maintain fertility, tilth, and the content of organic matter.

Interpretive Groups

Land capability classification: IIs
Range site: Clayey Overflow
Windbreak suitability group: 1K
Pasture suitability group: I

Ro—Roxbury silt loam, channeled

Composition

Roxbury and similar soils: 80 to 95 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Flood plains
Position on the landform: High flood plains
Slope range: 0 to 2 percent
Shape of areas: Elongated or irregular
Size of areas: 10 to 100 acres

Typical Profile

Surface layer:
0 to 12 inches—dark grayish brown, calcareous silt loam

Subsurface layer:
12 to 24 inches—grayish brown, calcareous silty clay loam

Underlying layers:
24 to 42 inches—grayish brown and very pale brown, calcareous silty clay loam
42 to 60 inches—dark gray, calcareous silty clay loam

Soil Properties and Qualities

Drainage class: Moderately well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: 40 to more than 60 inches over clayey or sandy alluvium
Depth to the water table: 3 to 6 feet
Flooding: Frequent for very brief periods
Ponding: None
Permeability: Moderate
Available water capacity: High
Content of organic matter: Moderate
Surface runoff: Low
Other features: Areas of this soil typically are dissected by a meandering channel.

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Lamo soils on high flood plains
• The moderately well drained Wakonda soils on footslopes
• The moderately well drained Davis soils, which are leached of free carbonates to a depth of 20 to more than 50 inches; on footslopes

Similar inclusions:
• Soils that have more sand and less silt

Use and Management

Rangeland and pasture

Suitability for crops: Generally unsuited
Management concerns: Wetness and the meandering channels, which limit cultivation
Management measures:
• Proper grazing management helps to maintain plant vigor.

Interpretive Groups

Land capability classification: VIw
Range site: Loamy Overflow
Windbreak suitability group: 1K
Pasture suitability group: NS

Sa—Salix silty clay loam, 0 to 2 percent slopes

Composition

Salix and similar soils: 80 to 90 percent
Contrasting inclusions: 10 to 20 percent

Setting

Landform: Flood plains
Position on the landform: Valley flats
Slope range: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 20 to 500 acres

Typical Profile

Surface layer:
0 to 15 inches—dark gray silty clay loam

Subsoil:
15 to 24 inches—dark grayish brown silty clay loam
24 to 34 inches—light brownish gray, calcareous silt loam with redox concentrations

Underlying layers:
34 to 52 inches—grayish brown, calcareous silt loam with redox concentrations
52 to 67 inches—light brownish gray, calcareous very fine sandy loam with redox concentrations and redox depletions
67 to 75 inches—grayish brown, calcareous fine sandy loam with redox concentrations
75 to 80 inches—light brownish gray, calcareous fine sand

Soil Properties and Qualities

Drainage class: Moderately well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: More than 60 inches
Depth to the water table: 4 to 6 feet
Flooding: Very rare
Ponding: None
Permeability: Moderate
Available water capacity: High
Content of organic matter: Moderate
Surface runoff: Low

Inclusions

Contrasting inclusions:
• The moderately well drained Lakeport soils, which have more clay than the Salix soil; on valley flats
• The well drained Blyburg soils, which have a thinner dark surface layer than the Salix soil and are more stratified; in positions on the landform similar to those of the Salix soil

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Well suited
Management concerns: Conserving moisture
Management measures:
• Crop residue management conserves moisture and helps to maintain tilth and the content of organic matter.

Interpretive Groups

Land capability classification: I
Range site: Silty
Windbreak suitability group: 3
Pasture suitability group: F

Sd—Salmo silty clay loam, 0 to 1 percent slopes

Composition

Salmo and similar soils: 80 to 95 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Flood plains
Position on the landform: Low flood plains
Slope range: 0 to 1 percent
Shape of areas: Elongated or irregular
Size of areas: 10 to 500 acres

Typical Profile

Surface layer:
0 to 6 inches—very dark gray, calcareous silty clay

loam with redox concentrations and with masses of salt

Subsoil:
6 to 24 inches—very dark gray, calcareous silty clay loam with masses of gypsum and other salts
24 to 41 inches—dark gray, calcareous silty clay loam with masses of gypsum
41 to 47 inches—light olive gray, calcareous silty clay loam with masses of gypsum
47 to 53 inches—light olive gray, calcareous silty clay loam

Underlying layer:
53 to 80 inches—light gray, calcareous clay loam

Soil Properties and Qualities

Drainage class: Poorly drained
Depth to bedrock: Very deep
Depth to contrasting parent material: 40 to more than 60 inches over gravelly alluvium
Water table: At the surface to 1.5 feet below the surface
Flooding: Occasional for brief periods
Ponding: None
Permeability: Moderately slow
Available water capacity: High
Content of organic matter: High
Surface runoff: Very low
Other properties: This soil has a high content of lime and salt.

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Lamo soils on high flood plains
• The poorly drained Baltic soils, which have more clay and less salt than the Salmo soil; in positions on the landform similar to those of the Salmo soil
• The somewhat poorly drained Whitewood soils on toeslopes
• The poorly drained James soils, which have more clay than the Salmo soil; in positions on the landform similar to those of the Salmo soil

Use and Management

Pasture and rangeland

Suitability for crops: Generally unsuited
Management concerns: Wetness; wind erosion; the high content of salt, which adversely affects the availability of water; and the high content of lime, which adversely affects the availability of plant nutrients
Management measures:
• In most years this soil is better suited to late-planted crops or to permanent pasture or hayland species than to other crops. Proper grazing management helps to maintain plant vigor.
• Maintaining existing drainage systems helps to remove excess water.

Interpretive Groups

Land capability classification: VIs
Range site: Saline Lowland
Windbreak suitability group: 10
Pasture suitability group: J

SeB—Sardak loamy fine sand, 2 to 9 percent slopes

Composition

Sardak and similar soils: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Flood plains
Position on the landform: Valley flats
Slope range: 2 to 9 percent
Shape of areas: Irregular
Size of areas: 15 to 750 acres

Typical Profile

Surface layer:
0 to 6 inches—grayish brown, calcareous loamy fine sand

Underlying layers:
6 to 10 inches—light brownish gray, calcareous loamy fine sand
10 to 80 inches—light brownish gray, calcareous fine sand

Soil Properties and Qualities

Drainage class: Excessively drained
Depth to bedrock: Very deep
Depth to contrasting parent material: More than 60 inches
Depth to the water table: More than 6 feet
Flooding: Very rare
Ponding: None
Permeability: Rapid
Available water capacity: Low
Content of organic matter: Low
Surface runoff: Very low

Inclusions

Contrasting inclusions:
• The well drained Grable soils, which have more clay and less sand in the surface layer than the Sardak

soil; in positions on the landform similar to those of the Sardak soil
• The well drained Ticonic soils, which have loamy material at a depth of 18 to 36 inches; in positions on the landform similar to those of the Sardak soil
• The moderately well drained Scroll soils, which have a clayey surface layer; in the lower positions on the landform

Use and Management

Pasture and rangeland

Main crops: Alfalfa, corn, oats, and soybeans (in irrigated areas)
Suitability for crops: Generally unsuited, except in irrigated areas
Management concerns: Wind erosion, water erosion, and limited available water capacity
Management measures:
• This soil is best suited to permanent pasture or hayland species. Proper grazing management helps to maintain plant vigor, conserves moisture, and helps to control erosion.

Interpretive Groups

Land capability classification: VIe
Range site: Sands
Windbreak suitability group: 7
Pasture suitability group: NS

SkB—Sardak-Scroll complex, 0 to 6 percent slopes

Composition

Sardak and similar soils: 45 to 60 percent
Scroll and similar soils: 20 to 35 percent
Contrasting inclusions: 10 to 25 percent

Setting

Landform: Flood plains
Position on the landform: Valley flats
Slope range: Sardak—0 to 6 percent; Scroll—0 to 2 percent
Shape of areas: Irregular
Size of areas: 5 to 250 acres

Typical Profile

Sardak

Surface layer:
0 to 6 inches—grayish brown, calcareous loamy fine sand

Underlying layers:
6 to 10 inches—light brownish gray, calcareous loamy fine sand
10 to 80 inches—light brownish gray, calcareous fine sand

Scroll

Surface layer:
0 to 8 inches—dark grayish brown, calcareous silty clay

Underlying layers:
8 to 11 inches—grayish brown (with redox concentrations), calcareous silt loam with thin strata of silty clay loam and silty clay
11 to 80 inches—light brownish gray, calcareous fine sand with redox concentrations

Soil Properties and Qualities

Drainage class: Sardak—excessively drained; Scroll—moderately well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: Sardak—more than 60 inches; Scroll—11 to 15 inches over sandy alluvium
Depth to the water table: Sardak—more than 6 feet; Scroll—3 to 5 feet
Flooding: Very rare
Ponding: None
Permeability: Sardak—rapid; Scroll—slow in the upper part and rapid in the lower part
Available water capacity: Low
Content of organic matter: Sardak—low; Scroll—moderately low
Surface runoff: Sardak—very low; Scroll—low

Inclusions

Contrasting inclusions:
• The moderately well drained Percival soils, which have sand at a lower depth than the Scroll soil; in positions on the landform similar to those of the Scroll soil
• The moderately well drained Lossing soils, which do not have sandy material above a depth of 40 inches; on valley flats
• The well drained Grable soils, which have 18 to 30 inches of coarse-silty material above the sand; on valley flats
• The well drained Ticonic soils, which have loamy material at a depth of 18 to 36 inches; on valley flats

Use and Management

Pasture and rangeland

Suitability for crops: Poorly suited

Management concerns: Sardak—wind erosion, water erosion, and limited available water capacity; Scroll—limited available water capacity
Management measures:
• The Sardak soil is best suited to permanent pasture or hayland species. Proper grazing management helps to maintain plant vigor, conserves moisture, and helps to control erosion.

Interpretive Groups

Land capability classification: Sardak—VIe; Scroll—IIIs
Range site: Sardak—Sands; Scroll—Clayey Overflow
Windbreak suitability group: Sardak—7; Scroll—6G
Pasture suitability group: Sardak—NS; Scroll—I

SpA—Scroll-Percival silty clays, 0 to 2 percent slopes

Composition

Scroll and similar soils: 40 to 55 percent
Percival and similar soils: 25 to 40 percent
Contrasting inclusions: 10 to 20 percent

Setting

Landform: Flood plains
Position on the landform: Valley flats
Slope range: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 25 to 500 acres

Typical Profile

Scroll

Surface layer:
0 to 8 inches—dark grayish brown, calcareous silty clay

Underlying layers:
8 to 11 inches—grayish brown (with redox concentrations), calcareous silt loam with thin strata of silty clay loam and silty clay
11 to 80 inches—light brownish gray, calcareous fine sand with redox concentrations

Percival

Surface layer:
0 to 7 inches—dark grayish brown, calcareous silty clay

Underlying layers:
7 to 25 inches—grayish brown, calcareous silty clay with redox concentrations
25 to 74 inches—light brownish gray and grayish brown (with redox concentrations), calcareous, stratified fine sand and loamy fine sand

Soil Properties and Qualities

Drainage class: Moderately well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: Scroll—11 to 15 inches over sandy alluvium; Percival—15 to 30 inches over sandy alluvium
Depth to the water table: 3 to 5 feet
Flooding: Very rare
Ponding: None
Permeability: Scroll—slow in the upper part and rapid in the lower part; Percival—slow
Available water capacity: Low
Content of organic matter: Moderately low
Surface runoff: Low

Inclusions

Contrasting inclusions:
• The moderately well drained Vore soils, which have thicker silty material in the upper part than the Scroll soil; on valley flats
• The moderately well drained Lossing soils, which do not have sandy material above a depth of 40 inches; on valley flats
• The excessively drained Sardak soils in the higher positions on the landform
• The well drained Grable soils on valley flats

Use and Management

Cropland

Main crops: Alfalfa, corn, and soybeans
Suitability for crops: Fairly well suited
Management concerns: Limited available water capacity
Management measures:
• These soils are better suited to early maturing crops than to other crops. Minimizing tillage and leaving crop residue on the surface conserve moisture and help to maintain the content of organic matter. Irrigation helps to overcome the limited available water capacity if the quality and quantity of the water are adequate.
• Rotations that include grasses and legumes help to control erosion and maintain fertility, tilth, and the content of organic matter.

Interpretive Groups

Land capability classification: Scroll—IIIs; Percival—IIs
Range site: Scroll—Clayey Overflow; Percival—Clayey Overflow
Windbreak suitability group: Scroll—6G; Percival—1K
Pasture suitability group: Scroll—I; Percival—I

SpB—Scroll-Percival silty clays, 2 to 6 percent slopes

Composition

Scroll and similar soils: 40 to 55 percent
Percival and similar soils: 30 to 45 percent
Contrasting inclusions: 10 to 20 percent

Setting

Landform: Flood plains
Position on the landform: Valley flats
Slope range: 2 to 6 percent
Shape of areas: Irregular
Size of areas: 20 to 500 acres

Typical Profile

Scroll

Surface layer:
0 to 8 inches—dark grayish brown, calcareous silty clay

Underlying layers:
8 to 11 inches—grayish brown (with redox concentrations), calcareous silt loam with thin strata of silty clay loam and silty clay
11 to 80 inches—light brownish gray, calcareous fine sand with redox concentrations

Percival

Surface layer:
0 to 7 inches—dark grayish brown, calcareous silty clay

Underlying layers:
7 to 25 inches—grayish brown, calcareous silty clay with redox concentrations
25 to 74 inches—light brownish gray and grayish brown (with redox concentrations), calcareous, stratified fine sand and loamy fine sand

Soil Properties and Qualities

Drainage class: Moderately well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: Scroll—11 to 15 inches over sandy alluvium; Percival—15 to 30 inches over sandy alluvium
Depth to the water table: 3 to 5 feet
Flooding: Very rare
Ponding: None
Permeability: Scroll—slow in the upper part and rapid in the lower part; Percival—slow
Available water capacity: Low
Content of organic matter: Moderately low
Surface runoff: Medium

Inclusions

Contrasting inclusions:
• The moderately well drained Vore soils, which have thicker silty material in the upper part than the Scroll soil; on valley flats
• The moderately well drained Lossing soils, which do not have sandy material above a depth of 40 inches; on valley flats
• The excessively drained Sardak soils in the higher positions on the landform
• The well drained Grable soils on valley flats

Use and Management

Cropland

Main crops: Alfalfa, corn, and soybeans
Suitability for crops: Fairly well suited
Management concerns: Water erosion, limited available water capacity
Management measures:
• These soils are better suited to early maturing crops than to other crops. Minimizing tillage and leaving crop residue on the surface conserve moisture, help to control erosion, and maintain the content of organic matter.
• Irrigation helps to overcome the limited available water capacity if the quality and quantity of the water are adequate.
• Rotations that include grasses and legumes help to control erosion and maintain fertility, tilth, and the content of organic matter.

Interpretive Groups

Land capability classification: Scroll—IVe; Percival—IIIe
Range site: Scroll—Clayey Overflow; Percival—Clayey Overflow
Windbreak suitability group: Scroll—6G; Percival—1K
Pasture suitability group: Scroll—I; Percival—I

TaE—Talmo-Thurman complex, 15 to 40 percent slopes

Composition

Talmo and similar soils: 40 to 50 percent
Thurman and similar soils: 20 to 40 percent
Contrasting inclusions: 10 to 25 percent

Setting

Landform: Outwash plains
Position on the landform: Talmo—shoulder slopes; Thurman—backslopes

Slope range: Talmo—15 to 40 percent; Thurman—15 to 30 percent
Shape of areas: Irregular
Size of areas: 10 to 150 acres

Typical Profile

Talmo

Surface layer:
0 to 9 inches—dark gray, calcareous gravelly loam

Underlying layers:
9 to 66 inches—brown and yellowish brown, calcareous gravelly sand and calcareous very gravelly sand
66 to 80 inches—reddish yellow, calcareous fine sand

Thurman

Surface layer:
0 to 19 inches—very dark gray loamy fine sand

Subsurface layer:
19 to 28 inches—dark gray loamy fine sand

Transitional layer:
28 to 36 inches—dark grayish brown loamy fine sand

Underlying layers:
36 to 57 inches—light olive brown and light yellowish brown fine sand
57 to 80 inches—light yellowish brown, calcareous fine sand

Soil Properties and Qualities

Drainage class: Talmo—excessively drained; Thurman—somewhat excessively drained
Depth to bedrock: Very deep
Depth to contrasting parent material: Talmo—5 to 14 inches over outwash sand and gravel; Thurman—40 to more than 60 inches over loamy glacial till
Depth to the water table: More than 6 feet
Flooding: None
Ponding: None
Permeability: Rapid
Available water capacity: Low
Content of organic matter: Moderately low
Surface runoff: Medium

Inclusions

Contrasting inclusions:
• The somewhat excessively drained Delmont soils, which have gravelly material at a depth of 14 to 20 inches; on backslopes
• The well drained Enet soils, which have gravelly material at a depth of 20 to 40 inches; on the lower backslopes and footslopes
• The well drained Betts soils, which do not have gravelly underlying material; on shoulder slopes

Use and Management

Rangeland and wildlife habitat

Suitability for crops: Not suited
Management concerns: Wind erosion, water erosion, and limited available water capacity
Management measures:
• Proper grazing management helps to maintain plant vigor and helps to control erosion.

Interpretive Groups

Land capability classification: Talmo—VIIe; Thurman—VIe
Range site: Talmo—Very Shallow; Thurman—Sandy
Windbreak suitability group: Talmo—10; Thurman—10
Pasture suitability group: Talmo—NS; Thurman—NS

Te—Tetonka silt loam, 0 to 1 percent slopes

Composition

Tetonka and similar soils: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Till plains
Position on the landform: Basins
Slope range: 0 to 1 percent
Shape of areas: Elliptical or oblong
Size of areas: 5 to 50 acres

Typical Profile

Surface layer:
0 to 8 inches—dark gray silt loam

Subsurface layer:
8 to 12 inches—gray silt loam

Subsoil:
12 to 20 inches—gray silt loam
20 to 31 inches—gray silty clay
31 to 59 inches—gray silty clay with redox concentrations

Underlying layer:
59 to 80 inches—gray silty clay loam with redox concentrations

Soil Properties and Qualities

Drainage class: Poorly drained
Depth to bedrock: Very deep

Depth to contrasting parent material: More than 60 inches
Water table: 1 foot above to 1 foot below the surface
Flooding: None
Ponding: Frequent for long periods
Permeability: Slow
Available water capacity: High
Content of organic matter: High
Surface runoff: Negligible

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Chancellor soils on the lower toeslopes
• The moderately well drained Davison and Wakonda soils on footslopes
• The very poorly drained Worthing soils in basins

Use and Management

Cropland

Main crops: Corn and soybeans
Suitability for crops: Poorly suited
Management concerns: Wetness
Management measures:
• In most years this soil is better suited to late-planted crops than to other crops. Leaving crop residue on the surface and deferring tillage when the soil is wet help to maintain tilth and minimize surface compaction.
• Maintaining existing drainage systems helps to remove excess water.

Interpretive Groups

Land capability classification: IVw
Range site: Wet Meadow
Windbreak suitability group: 10
Pasture suitability group: B2

ThA—Thurman loamy fine sand, 0 to 2 percent slopes

Composition

Thurman and similar soils: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Till plains and outwash plains
Position on the landform: Backslopes
Slope range: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 20 to 750 acres

Typical Profile

Surface layer:
0 to 19 inches—very dark gray loamy fine sand

Subsurface layer:
19 to 28 inches—dark gray loamy fine sand

Transitional layer:
28 to 36 inches—dark grayish brown loamy fine sand

Underlying layers:
36 to 57 inches—light olive brown and light yellowish brown fine sand
57 to 80 inches—light yellowish brown, calcareous fine sand

Soil Properties and Qualities

Drainage class: Somewhat excessively drained
Depth to bedrock: Very deep
Depth to contrasting parent material: 40 to more than 60 inches over loamy glacial till
Depth to the water table: More than 6 feet
Flooding: None
Ponding: None
Permeability: Rapid
Available water capacity: Low
Content of organic matter: Moderately low
Surface runoff: Very low

Inclusions

Contrasting inclusions:
• The well drained Wentworth soils, which have more silt and clay and less sand than the Thurman soil; on summits
• The well drained Egan soils, which have more silt and clay and less sand than the Thurman soil; on backslopes
• The somewhat poorly drained Whitewood soils, which have less sand and more silt and clay than the Thurman soil; on toeslopes

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Poorly suited
Management concerns: Wind erosion, limited available water capacity
Management measures:
• This soil is better suited to early maturing crops than to other crops. Minimizing tillage and leaving crop residue on the surface conserve moisture, help to control erosion, and maintain the content of organic matter.

• Rotations that include grasses and legumes help to control erosion and maintain the content of organic matter.
• Stripcropping and field windbreaks help to control wind erosion.
• Irrigation helps to overcome the limited available water capacity if the quality and quantity of the water are adequate.

Interpretive Groups

Land capability classification: IVs
Range site: Sandy
Windbreak suitability group: 5
Pasture suitability group: H

ThB—Thurman loamy fine sand, 2 to 6 percent slopes

Composition

Thurman and similar soils: 80 to 95 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Till plains and outwash plains
Position on the landform: Backslopes
Slope range: 2 to 6 percent
Shape of areas: Irregular
Size of areas: 5 to 500 acres

Typical Profile

Surface layer:
0 to 19 inches—very dark gray loamy fine sand

Subsurface layer:
19 to 28 inches—dark gray loamy fine sand

Transitional layer:
28 to 36 inches—dark grayish brown loamy fine sand

Underlying layers:
36 to 57 inches—light olive brown and light yellowish brown fine sand
57 to 80 inches—light yellowish brown, calcareous fine sand

Soil Properties and Qualities

Drainage class: Somewhat excessively drained
Depth to bedrock: Very deep
Depth to contrasting parent material: 40 to more than 60 inches over loamy glacial till
Depth to the water table: More than 6 feet
Flooding: None
Ponding: None
Permeability: Rapid
Available water capacity: Low
Content of organic matter: Moderately low
Surface runoff: Very low

Inclusions

Contrasting inclusions:
• The well drained Wentworth soils, which have more silt and clay and less sand than the Thurman soil; on summits
• The well drained Egan soils, which have more silt and clay and less sand than the Thurman soil; on backslopes
• The somewhat poorly drained Whitewood soils, which have less sand and more silt and clay than the Thurman soil; on toeslopes

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Poorly suited
Management concerns: Wind erosion, water erosion, and limited available water capacity
Management measures:
• This soil is better suited to early maturing crops than to other crops. Minimizing tillage and leaving crop residue on the surface conserve moisture, help to control erosion, and maintain the content of organic matter.
• Rotations that include grasses and legumes help to control erosion and maintain the content of organic matter.
• Stripcropping and field windbreaks help to control wind erosion.
• Irrigation helps to overcome the limited available water capacity if the quality and quantity of water are adequate.

Interpretive Groups

Land capability classification: IVe
Range site: Sandy
Windbreak suitability group: 5
Pasture suitability group: H

ThC—Thurman loamy fine sand, 6 to 9 percent slopes

Composition

Thurman and similar soils: 80 to 95 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Till plains and outwash plains
Position on the landform: Backslopes
Slope range: 6 to 9 percent

Shape of areas: Irregular
Size of areas: 10 to 150 acres

Typical Profile

Surface layer:
0 to 19 inches—very dark gray loamy fine sand

Subsurface layer:
19 to 28 inches—dark gray loamy fine sand

Transitional layer:
28 to 36 inches—dark grayish brown loamy fine sand

Underlying layers:
36 to 57 inches—light olive brown and light yellowish brown fine sand
57 to 80 inches—light yellowish brown, calcareous fine sand

Soil Properties and Qualities

Drainage class: Somewhat excessively drained
Depth to bedrock: Very deep
Depth to contrasting parent material: 40 to more than 60 inches over loamy glacial till
Depth to the water table: More than 6 feet
Flooding: None
Ponding: None
Permeability: Rapid
Available water capacity: Low
Content of organic matter: Moderately low
Surface runoff: Low

Inclusions

Contrasting inclusions:
• The well drained Egan soils, which have more silt and clay and less sand than the Thurman soil; on backslopes
• The well drained Ethan soils, which have more silt and clay and less sand than the Thurman soil; on shoulder slopes

Use and Management

Pasture

Suitability for crops: Generally unsuited
Management concerns: Wind erosion, water erosion, and limited available water capacity
Management measures:
• This soil is best suited to permanent pasture or hayland species. Proper grazing management helps to maintain plant vigor, conserves moisture, and helps to control erosion.

Interpretive Groups

Land capability classification: VIe
Range site: Sandy
Windbreak suitability group: 7
Pasture suitability group: H

Tr—Ticonic-Grable complex, 0 to 2 percent slopes

Composition

Ticonic and similar soils: 40 to 55 percent
Grable and similar soils: 25 to 45 percent
Contrasting inclusions: 10 to 25 percent

Setting

Landform: Flood plains
Position on the landform: Valley flats
Slope range: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 25 to 500 acres

Typical Profile

Ticonic

Surface layer:
0 to 9 inches—grayish brown, calcareous loamy fine sand

Underlying layers:
9 to 13 inches—light olive brown, calcareous loamy fine sand
13 to 26 inches—light brownish gray, calcareous, stratified fine sand and loamy fine sand
26 to 50 inches—light brownish gray, calcareous, stratified silt loam and very fine sandy loam
50 to 80 inches—light brownish gray, calcareous, stratified sand and fine sand

Grable

Surface layer:
0 to 8 inches—dark grayish brown, calcareous silt loam

Underlying layers:
8 to 26 inches—grayish brown (with redox concentrations), calcareous very fine sandy loam with thin strata of loamy very fine sand, very fine sand, and silt loam
26 to 80 inches—light brownish gray (with redox concentrations), calcareous very fine sandy loam with very fine sand, silt loam, and silty clay loam

Soil Properties and Qualities

Drainage class: Well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: Ticonic—18 to 36 inches over loamy alluvium; Grable—18 to 30 inches over sandy alluvium

Depth to the water table: More than 6 feet
Flooding: Very rare
Ponding: None
Permeability: Ticonic—rapid in the upper part and moderate in the lower part; Grable—moderate in the upper part and rapid in the lower part
Available water capacity: Ticonic—low; Grable—moderate
Content of organic matter: Ticonic—low; Grable—moderately low
Surface runoff: Ticonic—very low; Grable—low

Inclusions

Contrasting inclusions:
• The well drained Haynie soils, which do not have sandy material above a depth of 40 inches; on valley flats
• The excessively drained Sardak soils, which are sandy throughout; on valley flats
• The moderately well drained Scroll and Vore soils, which have a clayey surface layer; on valley flats

Use and Management

Cropland

Main crops: Corn, oats, and soybeans
Suitability for crops: Fairly well suited
Management concerns: Wind erosion, limited available water capacity
Management measures:
• These soils are better suited to early maturing crops than to other crops. Minimizing tillage and leaving crop residue on the surface conserve moisture, help to control erosion, and maintain the content of organic matter.
• Stripcropping and field windbreaks help to control wind erosion.
• Irrigation helps to overcome the limited available water capacity if the quality and quantity of the water are adequate.
• Rotations that include grasses and legumes help to control erosion and maintain fertility, tilth, and the content of organic matter.

Interpretive Groups

Land capability classification: Ticonic—IIIs; Grable—IIs
Range site: Ticonic—Sandy; Grable—Silty
Windbreak suitability group: Ticonic—5; Grable—1K
Pasture suitability group: Ticonic—H; Grable—D1

TtA—Trent-Tetonka-Wakonda complex, 0 to 3 percent slopes

Composition

Trent and similar soils: 35 to 45 percent
Tetonka and similar soils: 20 to 35 percent
Wakonda and similar soils: 20 to 35 percent
Contrasting inclusions: 10 to 20 percent

Setting

Landform: Till plains
Position on the landform: Trent—upper footslopes; Tetonka—basins; Wakonda—lower footslopes
Slope range: Trent—0 to 2 percent; Tetonka—0 to 1 percent; Wakonda—0 to 3 percent
Shape of areas: Irregular
Size of areas: 25 to 1,500 acres

Typical Profile

Trent

Surface soil:
0 to 17 inches—very dark gray silty clay loam

Subsoil:
17 to 28 inches—very dark grayish brown silty clay loam
28 to 47 inches—grayish brown silty clay loam
47 to 52 inches—light brownish gray, calcareous silty clay loam with redox concentrations and redox depletions
52 to 64 inches—pale yellow, calcareous silty clay loam with redox concentrations and redox depletions

Underlying layers:
64 to 71 inches—light yellowish brown, calcareous silty clay loam with redox concentrations and redox depletions
71 to 80 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Tetonka

Surface layer:
0 to 8 inches—dark gray silt loam

Subsurface layer:
8 to 12 inches—gray silt loam

Subsoil:
12 to 20 inches—gray silt loam
20 to 31 inches—gray silty clay
31 to 59 inches—gray silty clay with redox concentrations

Underlying layer:
59 to 80 inches—gray silty clay loam with redox concentrations

Wakonda

Surface layer:
0 to 9 inches—grayish brown, calcareous silt loam

Subsoil:
9 to 18 inches—light brownish gray, calcareous silt loam with redox concentrations and with masses of gypsum
18 to 30 inches—light yellowish brown, calcareous silt loam with redox concentrations and redox depletions and with masses of gypsum
30 to 35 inches—pale yellow, calcareous silt loam with redox concentrations and redox depletions and with masses of gypsum

Underlying layers:
35 to 62 inches—light gray, calcareous silt loam with redox concentrations and redox depletions and with nests of gypsum
62 to 80 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions and with masses of gypsum

Soil Properties and Qualities

Drainage class: Trent—moderately well drained; Tetonka—poorly drained; Wakonda—moderately well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: Trent—40 to more than 60 inches over loamy glacial till; Tetonka—more than 60 inches; Wakonda—40 to more than 60 inches over loamy glacial till
Water table: Trent—at a depth of 3.5 to 5.0 feet; Tetonka—1 foot above to 1 foot below the surface; Wakonda—at a depth of 1 to 3 feet
Flooding: None
Ponding: Trent—none; Tetonka—frequent for long periods; Wakonda—none
Permeability: Trent—moderate; Tetonka—slow; Wakonda—moderate
Available water capacity: High
Content of organic matter: Trent—high; Tetonka—high; Wakonda—moderate
Surface runoff: Trent—low; Tetonka—negligible; Wakonda—low
Other properties: The Wakonda soil has a high content of lime and salt.

Inclusions

Contrasting inclusions:
- The well drained Egan soils on backslopes
- The well drained Wentworth soils on summits and backslopes
- The somewhat poorly drained Whitewood soils on toeslopes
- The very poorly drained Worthing soils, which do not have a subsurface layer of silt loam; in basins

Similar inclusions:
- Soils that have more sand and less silt than the Wakonda soil

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Fairly well suited
Management concerns: Trent—excess moisture during wet years; Tetonka—wetness; Wakonda—wind erosion and the high content of lime, which adversely affects the availability of plant nutrients
Management measures:
- Minimizing tillage and leaving crop residue on the surface conserve moisture and help to control erosion.
- Rotations that include grasses and legumes help to control erosion and maintain fertility, tilth, and the content of organic matter.
- Stripcropping and field windbreaks help to control wind erosion.
- In most years the Tetonka soil is better suited to late-planted crops than to other crops. Leaving crop residue on the surface and deferring tillage when the soil is wet help to maintain tilth and minimize surface compaction. Maintaining existing drainage systems helps to remove excess water.

Interpretive Groups

Land capability classification: Trent—I; Tetonka—IVw; Wakonda—IIs
Range site: Trent—Loamy Overflow; Tetonka—Wet Meadow; Wakonda—Limy Subirrigated
Windbreak suitability group: Trent—1; Tetonka—10; Wakonda—1K
Pasture suitability group: Trent—K; Tetonka—B2; Wakonda—F

TwA—Trent-Wentworth silty clay loams, 0 to 2 percent slopes

Composition

Trent and similar soils: 40 to 60 percent
Wentworth and similar soils: 25 to 40 percent
Contrasting inclusions: 10 to 20 percent

Setting

Landform: Till plains
Position on the landform: Trent—backslopes and footslopes; Wentworth—shoulder slopes and upper backslopes
Slope range: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 20 to 250 acres

Typical Profile

Trent

Surface soil:
0 to 17 inches—very dark gray silty clay loam

Subsoil:
17 to 28 inches—very dark grayish brown silty clay loam
28 to 47 inches—grayish brown silty clay loam
47 to 52 inches—light brownish gray, calcareous silty clay loam with redox concentrations and redox depletions
52 to 64 inches—pale yellow, calcareous silty clay loam with redox concentrations and redox depletions

Underlying layers:
64 to 71 inches—light yellowish brown, calcareous silty clay loam with redox concentrations and redox depletions
71 to 80 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Wentworth

Surface layer:
0 to 7 inches—dark grayish brown silty clay loam

Subsoil:
7 to 11 inches—dark grayish brown silty clay loam
11 to 31 inches—brown silty clay loam
31 to 49 inches—pale brown, calcareous silty clay loam
49 to 56 inches—light yellowish brown, calcareous clay loam with redox concentrations

Underlying layer:
56 to 80 inches—light yellowish brown, calcareous clay loam with redox concentrations and redox depletions

Soil Properties and Qualities

Drainage class: Trent—moderately well drained; Wentworth—well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: 40 to more than 60 inches over loamy glacial till
Depth to the water table: Trent—3.5 to 5.0 feet; Wentworth—more than 6 feet
Flooding: None
Ponding: None
Permeability: Moderate
Available water capacity: High
Content of organic matter: Trent—high; Wentworth—moderate
Surface runoff: Low
Other features: Runoff water flows over areas of the Trent soil during periods of rainfall or snowmelt.

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Whitewood soils on toeslopes
• The somewhat poorly drained Chancellor soils on the lower toeslopes
• The moderately well drained Wakonda soils, which have free carbonates at or near the surface; on footslopes
• The poorly drained Tetonka soils in basins

Similar inclusions:
• Soils that have glacial till higher in the profile than the Wentworth soil

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Well suited
Management concerns: Wentworth—conserving moisture; Trent—excess moisture during wet years
Management measures:
• Crop residue management conserves moisture and helps to maintain tilth and the content of organic matter.

Interpretive Groups

Land capability classification: Trent—I; Wentworth—I
Range site: Trent—Loamy Overflow; Wentworth—Silty
Windbreak suitability group: Trent—1; Wentworth—3
Pasture suitability group: Trent—K; Wentworth—F

W—Water

Definition

• This map unit consists of naturally occurring basins of surface water.

Wa—Wakonda-Tetonka silt loams, 0 to 2 percent slopes

Composition

Wakonda and similar soils: 40 to 55 percent
Tetonka and similar soils: 20 to 40 percent
Contrasting inclusions: 10 to 25 percent

Setting

Landform: Till plains
Position on the landform: Wakonda—footslopes; Tetonka—basins
Slope range: Wakonda—0 to 2 percent; Tetonka—0 to 1 percent
Shape of areas: Irregular
Size of areas: 20 to 500 acres

Typical Profile

Wakonda

Surface layer:
0 to 9 inches—grayish brown, calcareous silt loam

Subsoil:
9 to 18 inches—light brownish gray, calcareous silt loam with redox concentrations and with masses of gypsum
18 to 30 inches—light yellowish brown, calcareous silt loam with redox concentrations and redox depletions and with masses of gypsum
30 to 35 inches—pale yellow, calcareous silt loam with redox concentrations and redox depletions and with masses of gypsum

Underlying layers:
35 to 62 inches—light gray, calcareous silt loam with redox concentrations and redox depletions and with nests of gypsum
62 to 80 inches—pale yellow, calcareous loam with redox concentrations and redox depletions and with masses of gypsum

Tetonka

Surface layer:
0 to 8 inches—dark gray silt loam

Subsurface layer:
8 to 12 inches—gray silt loam

Subsoil:
12 to 20 inches—gray silt loam
20 to 31 inches—gray silty clay
31 to 59 inches—gray silty clay with redox concentrations

Underlying layer:
59 to 80 inches—gray silty clay loam with redox concentrations

Soil Properties and Qualities

Drainage class: Wakonda—moderately well drained; Tetonka—poorly drained
Depth to bedrock: Very deep
Depth to contrasting parent material: Wakonda—40 to more than 60 inches over loamy glacial till; Tetonka—more than 60 inches
Water table: Wakonda—at a depth of 1 to 3 feet; Tetonka—1 foot above to 1 foot below the surface
Flooding: None
Ponding: Wakonda—none; Tetonka—frequent for long periods
Permeability: Wakonda—moderate; Tetonka—slow
Available water capacity: High
Content of organic matter: Wakonda—moderate; Tetonka—high
Surface runoff: Wakonda—low; Tetonka—negligible
Other properties: The Wakonda soil has a high content of lime and salt.

Inclusions

Contrasting inclusions:
- The somewhat poorly drained Whitewood soils on toeslopes
- The somewhat poorly drained Chancellor soils on the lower toeslopes
- The well drained Wentworth soils on summits and backslopes
- The moderately well drained Trent soils on footslopes

Similar inclusions:
- Soils that have more sand and less silt than the Wakonda soil

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Fairly well suited
Management concerns: Wakonda—wind erosion, the high content of salt (which adversely affects the availability of moisture), and the high content of lime (which adversely affects the availability of plant nutrients); Tetonka—wetness
Management measures:
- In wet years the Wakonda soil is better suited to late-planted crops than to other crops. Minimizing tillage and leaving crop residue on the surface

conserve moisture and help to control wind erosion. Rotations that include grasses and legumes help to control erosion and maintain fertility, tilth, and the content of organic matter. Wind stripcropping and field windbreaks help to control wind erosion.

• In most years the Tetonka soil is better suited to late-planted crops than to other crops. Leaving crop residue on the surface and deferring tillage when the soil is wet help to maintain tilth and minimize surface compaction. Maintaining existing drainage systems helps to remove excess water.

Interpretive Groups

Land capability classification: Wakonda—IIs; Tetonka—IVw
Range site: Wakonda—Limy Subirrigated; Tetonka—Wet Meadow
Windbreak suitability group: Wakonda—1K; Tetonka—10
Pasture suitability group: Wakonda—F; Tetonka—B2

Wc—Wakonda-Wentworth-Whitewood complex, 0 to 2 percent slopes

Composition

Wakonda and similar soils: 35 to 50 percent
Wentworth and similar soils: 20 to 35 percent
Whitewood and similar soils: 15 to 30 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Till plains
Position on the landform: Wakonda—footslopes; Wentworth—summits; Whitewood—lower toeslopes
Slope range: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 20 to 1,000 acres

Typical Profile

Wakonda

Surface layer:
0 to 9 inches—grayish brown, calcareous silt loam

Subsoil:
9 to 18 inches—light brownish gray, calcareous silt loam with redox concentrations and with masses of gypsum
18 to 30 inches—light yellowish brown, calcareous silt loam with redox concentrations and redox depletions and with masses of gypsum
30 to 35 inches—pale yellow, calcareous silt loam with redox concentrations and redox depletions and with masses of gypsum

Underlying layers:
35 to 62 inches—light gray, calcareous silt loam with redox concentrations and redox depletions and with nests of gypsum
62 to 80 inches—pale yellow, calcareous loam with redox concentrations and redox depletions and with masses of gypsum

Wentworth

Surface layer:
0 to 7 inches—dark grayish brown silty clay loam

Subsoil:
7 to 11 inches—dark grayish brown silty clay loam
11 to 31 inches—brown silty clay loam
31 to 49 inches—pale brown, calcareous silty clay loam
49 to 56 inches—light yellowish brown, calcareous clay loam with redox concentrations

Underlying layer:
56 to 80 inches—light yellowish brown, calcareous clay loam with redox concentrations and redox depletions

Whitewood

Surface soil:
0 to 14 inches—dark gray silty clay loam

Subsoil:
14 to 32 inches—grayish brown silty clay loam with redox concentrations
32 to 48 inches—light olive gray silty clay loam with redox concentrations

Underlying layers:
48 to 76 inches—light gray, calcareous silty clay loam with redox concentrations and redox depletions
76 to 80 inches—light gray, calcareous clay loam with redox concentrations and redox depletions

Soil Properties and Qualities

Drainage class: Wakonda—moderately well drained; Wentworth—well drained; Whitewood—somewhat poorly drained
Depth to bedrock: Very deep
Depth to contrasting parent material: Wakonda and Wentworth—40 to more than 60 inches over loamy glacial till; Whitewood—more than 60 inches
Depth to the water table: Wakonda—1 to 3 feet; Wentworth—more than 6 feet; Whitewood—1 to 2 feet

Flooding: Wakonda and Wentworth—none; Whitewood—occasional for very brief periods
Ponding: None
Permeability: Wakonda and Wentworth—moderate; Whitewood—moderately slow
Available water capacity: High
Content of organic matter: Wakonda and Wentworth—moderate; Whitewood—high
Surface runoff: Low
Other properties: The Wakonda soil has a high content of lime and salt.

Inclusions

Contrasting inclusions:
- The poorly drained Tetonka soils in basins
- The somewhat poorly drained Chancellor soils on the lower toeslopes
- The moderately well drained Trent soils, which are leached of free carbonates to a depth of more than 30 inches; on footslopes

Similar inclusions:
- Soils that have glacial till higher in the profile than the Wentworth soil
- Soils that have more sand and less silt than the Wakonda soil

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Well suited
Management concerns: Wakonda—wind erosion, the high content of salt (which adversely affects the availability of moisture), and the high content of lime (which adversely affects the availability of plant nutrients); Wentworth—conserving moisture; Whitewood—wetness
Management measures:
- In wet years the Wakonda and Whitewood soils are better suited to late-planted crops than to other crops. Minimizing tillage and leaving crop residue on the surface conserve moisture and help to control wind erosion. Rotations that include grasses and legumes help to control erosion and maintain fertility, tilth, and the content of organic matter.
- Wind stripcropping and field windbreaks help to control wind erosion.

Interpretive Groups

Land capability classification: Wakonda—IIs; Wentworth—I; Whitewood—IIw
Range site: Wakonda—Limy Subirrigated; Wentworth—Silty; Whitewood—Loamy Overflow
Windbreak suitability group: Wakonda—1K; Wentworth—3; Whitewood—2
Pasture suitability group: Wakonda—F; Wentworth—F; Whitewood—A

Wd—Wakonda-Whitewood complex, 0 to 2 percent slopes

Composition

Wakonda and similar soils: 40 to 60 percent
Whitewood and similar soils: 20 to 40 percent
Contrasting inclusions: 10 to 25 percent

Setting

Landform: Till plains
Position on the landform: Wakonda—footslopes; Whitewood—lower toeslopes
Slope range: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 100 to 1,000 acres

Typical Profile

Wakonda

Surface layer:
0 to 9 inches—grayish brown, calcareous silt loam

Subsoil:
9 to 18 inches—light brownish gray, calcareous silt loam with redox concentrations and with masses of gypsum
18 to 30 inches—light yellowish brown, calcareous silt loam with redox concentrations and redox depletions and with masses of gypsum
30 to 35 inches—pale yellow, calcareous silt loam with redox concentrations and redox depletions and with masses of gypsum

Underlying layers:
35 to 62 inches—light gray, calcareous silt loam with redox concentrations and redox depletions and with nests of gypsum
62 to 80 inches—pale yellow, calcareous loam with redox concentrations and redox depletions and with masses of gypsum

Whitewood

Surface soil:
0 to 14 inches—dark gray silty clay loam

Subsoil:
14 to 32 inches—grayish brown silty clay loam with redox concentrations
32 to 48 inches—light olive gray silty clay loam with redox concentrations

Underlying layers:
48 to 76 inches—light gray, calcareous silty clay loam with redox concentrations and redox depletions
76 to 80 inches—light gray, calcareous clay loam with redox concentrations and redox depletions

Soil Properties and Qualities

Drainage class: Wakonda—moderately well drained; Whitewood—somewhat poorly drained
Depth to bedrock: Very deep
Depth to contrasting parent material: Wakonda—40 to more than 60 inches over loamy glacial till; Whitewood—more than 60 inches
Depth to the water table: Wakonda—1 to 3 feet; Whitewood—1 to 2 feet
Flooding: Wakonda—none; Whitewood—occasional for very brief periods
Ponding: None
Permeability: Wakonda—moderate; Whitewood—moderately slow
Available water capacity: High
Content of organic matter: Wakonda—moderate; Whitewood—high
Surface runoff: Low
Other properties: The Wakonda soil has a high content of lime and salt.

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Chancellor soils on the lower toeslopes
• The well drained Wentworth soils on summits and backslopes
• The moderately well drained Trent soils, which are leached of free carbonates to a depth of more than 30 inches; on footslopes
• The poorly drained Tetonka soils in basins

Similar inclusions:
• Soils that have more sand and less silt than the Wakonda soil

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Well suited
Management concerns: Wakonda—wind erosion, the high content of salt (which adversely affects the availability of moisture), and the high content of lime (which adversely affects the availability of plant nutrients); Whitewood—wetness
Management measures:
• In wet years these soils are better suited to late-planted crops than to other crops. Minimizing tillage, deferring tillage, and leaving crop residue on the surface conserve moisture, minimize surface compaction, and help to control erosion.
• Rotations that include grasses and legumes help to control erosion and maintain fertility, tilth, and the content of organic matter.
• Wind stripcropping and field windbreaks help to control wind erosion.

Interpretive Groups

Land capability classification: Wakonda—IIs; Whitewood—IIw
Range site: Wakonda—Limy Subirrigated; Whitewood—Loamy Overflow
Windbreak suitability group: Wakonda—1K; Whitewood—2
Pasture suitability group: Wakonda—F; Whitewood—A

WkB—Wentworth-Trent silty clay loams, 1 to 6 percent slopes

Composition

Wentworth and similar soils: 40 to 50 percent
Trent and similar soils: 35 to 45 percent
Contrasting inclusions: 10 to 20 percent

Setting

Landform: Till plains
Position on the landform: Wentworth—summits and backslopes; Trent—footslopes
Slope range: Wentworth—2 to 6 percent; Trent—1 to 2 percent
Shape of areas: Irregular
Size of areas: 20 to 250 acres

Typical Profile

Wentworth

Surface layer:
0 to 7 inches—dark grayish brown silty clay loam

Subsoil:
7 to 11 inches—dark grayish brown silty clay loam
11 to 31 inches—brown silty clay loam
31 to 49 inches—pale brown, calcareous silty clay loam
49 to 56 inches—light yellowish brown, calcareous clay loam with redox concentrations

Underlying layer:
56 to 80 inches—light yellowish brown, calcareous clay loam with redox concentrations and redox depletions

Trent

Surface soil:
0 to 17 inches—very dark gray silty clay loam

Subsoil:
17 to 28 inches—very dark grayish brown silty clay loam
28 to 47 inches—grayish brown silty clay loam
47 to 52 inches—light brownish gray, calcareous silty clay loam with redox concentrations and redox depletions
52 to 64 inches—pale yellow, calcareous silty clay loam with redox concentrations and redox depletions

Underlying layers:
64 to 71 inches—light yellowish brown, calcareous silty clay loam with redox concentrations and redox depletions
71 to 80 inches—pale yellow, calcareous clay loam with redox concentrations and redox depletions

Soil Properties and Qualities

Drainage class: Wentworth—well drained; Trent—moderately well drained
Depth to bedrock: Very deep
Depth to contrasting parent material: 40 to more than 60 inches over loamy glacial till
Depth to the water table: Wentworth—more than 6 feet; Trent—3.5 to 5.0 feet
Flooding: None
Ponding: None
Permeability: Moderate
Available water capacity: High
Content of organic matter: Wentworth—moderate; Trent—high
Surface runoff: Wentworth—medium; Trent—low
Other features: Runoff water flows over areas of the Trent soil during periods of rainfall or snowmelt.

Inclusions

Contrasting inclusions:
• The moderately well drained Wakonda soils, which have free carbonates at or near the surface; on footslopes
• The somewhat poorly drained Chancellor soils on the lower toeslopes
• The poorly drained Tetonka soils in basins
• The somewhat poorly drained Whitewood soils on toeslopes

Similar inclusions:
• Soils that have glacial till higher in the profile than the Wentworth soil

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Well suited
Management concerns: Wentworth—water erosion; Trent—excess moisture during wet years
Management measures:
• Minimizing tillage and leaving crop residue on the surface conserve moisture and help to control erosion.
• Rotations that include grasses and legumes help to control erosion and maintain fertility, tilth, and the content of organic matter.

Interpretive Groups

Land capability classification: Wentworth—IIe; Trent—I
Range site: Wentworth—Silty; Trent—Loamy Overflow
Windbreak suitability group: Wentworth—3; Trent—1
Pasture suitability group: Wentworth—F; Trent—K

Wm—Whitewood silty clay loam, 0 to 2 percent slopes

Composition

Whitewood and similar soils: 80 to 90 percent
Contrasting inclusions: 10 to 20 percent

Setting

Landform: Till plains
Position on the landform: Toeslopes
Slope range: 0 to 2 percent
Shape of areas: Elongated or irregular
Size of areas: 10 to 200 acres

Typical Profile

Surface soil:
0 to 14 inches—dark gray silty clay loam

Subsoil:
14 to 32 inches—grayish brown silty clay loam with redox concentrations
32 to 48 inches—light olive gray silty clay loam with redox concentrations

Underlying layers:
48 to 76 inches—light gray, calcareous silty clay loam with redox concentrations and redox depletions
76 to 80 inches—light gray, calcareous clay loam with redox concentrations and redox depletions

Soil Properties and Qualities

Drainage class: Somewhat poorly drained
Depth to bedrock: Very deep

Depth to contrasting parent material: More than 60 inches
Depth to the water table: 1 to 2 feet
Flooding: Occasional for very brief periods
Ponding: None
Permeability: Moderately slow
Available water capacity: High
Content of organic matter: High
Surface runoff: Low

Inclusions

Contrasting inclusions:
• The moderately well drained Wakonda soils on footslopes
• The somewhat poorly drained Lamo soils on high flood plains
• The somewhat poorly drained Chancellor soils, which have more clay than the Whitewood soil; on the lower toeslopes
• The moderately well drained Bon soils, which have more sand and less silt than the Whitewood soil; on high flood plains

Use and Management

Cropland

Main crops: Alfalfa, corn, oats, and soybeans
Suitability for crops: Well suited
Management concerns: Wetness
Management measures:
• In wet years this soil is better suited to late-planted crops than to other crops. Leaving crop residue on the surface and deferring tillage when the soil is wet help to maintain tilth and minimize surface compaction.

Interpretive Groups

Land capability classification: IIw
Range site: Loamy Overflow
Windbreak suitability group: 2
Pasture suitability group: A

Wo—Worthing silty clay loam, 0 to 1 percent slopes

Composition

Worthing and similar soils: 85 to 100 percent
Contrasting inclusions: 0 to 15 percent

Setting

Landform: Till plains
Position on the landform: Basins
Slope range: 0 to 1 percent
Shape of areas: Elliptical or oblong
Size of areas: 8 to 100 acres

Typical Profile

Surface soil:
0 to 18 inches—very dark gray silty clay loam with redox concentrations in the lower part

Subsoil:
18 to 24 inches—very dark gray silty clay with redox concentrations
24 to 41 inches—dark gray silty clay with redox concentrations
41 to 53 inches—gray silty clay with redox concentrations
53 to 80 inches—light gray, calcareous silty clay loam with redox concentrations

Soil Properties and Qualities

Drainage class: Very poorly drained
Depth to bedrock: Very deep
Depth to contrasting parent material: More than 60 inches
Water table: 2 feet above to 1 foot below the surface
Flooding: None
Ponding: Frequent for long periods
Permeability: Slow
Available water capacity: High
Content of organic matter: High
Surface runoff: Negligible

Inclusions

Contrasting inclusions:
• The moderately well drained Davison soils on footslopes
• The poorly drained Tetonka soils in basins
• The moderately well drained Wakonda soils on footslopes
• The somewhat poorly drained Chancellor soils on the lower toeslopes

Use and Management

Pasture and cropland

Main crops: Alfalfa, corn, and soybeans in drained areas
Suitability for crops: Generally unsuited, except in drained areas
Management concerns: Wetness
Management measures:
• In most years this soil is better suited to late-planted crops or to water-tolerant pasture plants than to other plants. Proper grazing management helps to maintain plant vigor.
• Restricting grazing and deferring planting during wet periods can minimize surface compaction. Maintaining

existing drainage systems helps to remove excess water.

Interpretive Groups

Land capability classification: Vw
Range site: Shallow Marsh
Windbreak suitability group: 10
Pasture suitability group: B2

Wp—Worthing silty clay loam, ponded

Composition

Worthing and similar soils: 90 to 100 percent
Contrasting inclusions: 0 to 10 percent

Setting

Landform: Till plains
Position on the landform: Basins
Slope range: 0 to 1 percent
Shape of areas: Elliptical or oblong
Size of areas: 8 to 100 acres

Typical Profile

Surface soil:
0 to 18 inches—very dark gray silty clay loam with redox concentrations in the lower part

Subsoil:
18 to 24 inches—very dark gray silty clay with redox concentrations
24 to 41 inches—dark gray silty clay with redox concentrations
41 to 53 inches—gray silty clay with redox concentrations
53 to 80 inches—light gray, calcareous silty clay loam with redox concentrations

Soil Properties and Qualities

Drainage class: Very poorly drained
Depth to bedrock: Very deep
Depth to contrasting parent material: More than 60 inches
Water table: 3 feet above to 0.5 foot below the surface
Flooding: None
Ponding: Frequent for very long periods
Permeability: Slow
Available water capacity: High
Content of organic matter: High
Surface runoff: Negligible

Inclusions

Contrasting inclusions:
- The moderately well drained Davison and Wakonda soils on footslopes
- The poorly drained Tetonka soils in basins
- The somewhat poorly drained Chancellor soils on the lower toeslopes

Use and Management

Wildlife habitat

Management considerations:
- Because of wetness, this soil is not suited to crops.
- Areas of this map unit can be used as habitat for wildlife.

Interpretive Groups

Land capability classification: VIIIw
Range site: Not assigned
Windbreak suitability group: 10
Pasture suitability group: NS

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland or woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in the survey area. The survey can help planners maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

The soils in the survey area are assigned to various interpretive groups at the end of each map unit description and in some of the tables. The groups for each map unit also are shown in the section "Interpretive Groups."

Crops

Jeffrey A. Hemenway, conservation agronomist, Natural Resources Conservation Service, helped prepare this section.

General management needed for crops is suggested in this section. The crops best suited to the soils, including some not commonly grown in the survey area, are identified; prime farmland is described; soil productivity ratings and the estimated yields of the main crops and hay and pasture plants are listed for each soil; and the system of land capability classification used by the Natural Resources Conservation Service is explained.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading "Detailed Soil Map Units." Specific information can be obtained from the local office of the Natural Resources Conservation Service, the Cooperative Extension Service, or the South Dakota Agricultural Experiment Station.

About 83 percent of the acreage in Clay County is used for cultivated crops (U.S. Department of Commerce, 1992). The major crops are alfalfa, corn, and soybeans. Oats and wheat also are grown. Alfalfa is harvested mainly for hay or as a cash crop. Soybeans are grown as a cash crop; corn and oats are grown as a cash crop and as livestock feed. Corn is harvested for both grain and silage.

The potential of the soils in Clay County for increased crop production is good. Crop production could be increased considerably by extending the latest crop production technology to all cropland in the county. This soil survey can greatly facilitate the application of such technology. The paragraphs that follow describe the management needed on the cropland in the county.

Water erosion reduces productivity and results in sedimentation. It is a major problem on about one-third of the cropland, hayland, and pasture in Clay County. It is a hazard on Betts, Clarno, Egan, Ethan, Talmo, and other soils if the slope is more than 2 percent. Productivity is reduced when the more fertile surface layer is lost and part of the subsoil is incorporated into the plow layer. Loss of the surface layer is especially damaging on soils that have a thin surface layer, such as Betts and Ethan soils. Erosion also reduces the productivity of soils that tend to be droughty, such as Delmont and Enet soils. When erosion occurs, sediments rich in nutrients and, possibly, pesticides enter streams, lakes, and potholes. Measures that control water erosion minimize the pollution of streams and lakes by sediment and preserve the quality of water for fish and wildlife, recreation, and municipal uses. These measures also reduce the amount of fertilizer needed in cropped areas by helping to prevent the removal of plant nutrients.

A cropping sequence that keeps a plant cover on the surface for extended periods holds soil losses to an amount that will not reduce the productive capacity of the soils. If a protective cover of plants cannot be maintained, careful management of crop residue is essential. Minimizing tillage and leaving crop residue on the surface increase the infiltration rate, reduce the runoff rate, and help to control erosion.

Terraces and diversions reduce the length of slopes and the runoff rate and help to control erosion on the gently sloping Egan soils. In many areas, Betts, Clarno, Ethan, and Talmo soils are poorly suited to terraces and diversions because of short, irregular slopes or an unfavorable subsoil that would be exposed in terrace channels.

Wind erosion is a slight or moderate hazard on many of the soils in the county. The hazard is greatest on the sandy Sardak, Ticonic, and Thurman soils and on the clayey Albaton, Baltic, Blencoe, Forney, James, Onawa, Owego, Percival, and Scroll soils. Soils that have a high content of lime in the surface layer, such as Betts, Davison, Ethan, Lamo, Salmo, and Wakonda soils, also are highly susceptible. Wind erosion can damage these soils in only a few hours if the winds are strong and the soils are dry and are not protected by a plant cover or surface mulch. An adequate plant cover, a cover of crop residue, stripcropping, and a rough surface help to control wind erosion. Windbreaks of suitable trees and shrubs also are effective in controlling wind erosion.

Information about the measures that control erosion on each kind of soil is contained in the Field Office Technical Guide, which is available in the local office of the Natural Resources Conservation Service.

Wetness is an important management concern on the somewhat poorly drained and poorly drained Albaton, Baltic, Blencoe, Chancellor, Clamo, Dimo, Forney, James, Lex, Luton, Napa, Norway, Owego, Salmo, Tetonka, Whitewood, and Worthing soils. Unless they are artificially drained, these soils are so wet that crops frequently are damaged. Open ditches can help to remove excess water if drainage outlets are available. Controlling the runoff from adjacent slopes also helps to overcome wetness on these soils.

The moderately well drained Alcester, Bon, Dalesburg, Davis, Lossing, Onawa, Roxbury, Salix, and Trent soils on valley flats, high flood plains, and footslopes receive additional moisture when streams occasionally overflow and when water runs off the higher adjacent uplands. Tillage and planting are delayed in the spring during wet years. In most years, however, natural drainage is adequate and crops benefit from the additional moisture.

Soil fertility helps to determine the yields that can be obtained from the soil. It can be improved by applying fertilizer and by including grasses and legumes in the cropping system. In soils that have a high content of lime in the surface layer, such as Betts, Davison, Ethan, Lamo, Salmo, Storla, and Wakonda soils, the kinds and amounts of fertilizer should be based on the results of soil tests, on the needs of the crop, and on the expected level of yields. The South Dakota Cooperative Extension Service can help in determining the kinds and amounts of fertilizer needed, the preferred application method, and the preferred time of application. The preferred methods may vary depending on the crop; the type of soil; climatic conditions; and the location of the field, its depth to an aquifer, and its distance from a stream or lake.

Soil tilth is an important factor in the germination of seeds and the infiltration of water into the soil. Soils that have good tilth are granular and porous. Maintaining tilth is a concern in most areas of the somewhat poorly drained, poorly drained, and very poorly drained soils in the county. These soils commonly are wet in the spring, and they dry out slowly. They are difficult to till, and tilth can deteriorate if they are cultivated at a high moisture content. If tilled when wet, these soils tend to be cloddy when dry. As a result of the cloddiness, preparing a good seedbed is difficult. Tilling in a timely manner, including grasses and legumes in the cropping system, and incorporating crop residue into the soil improve tilth and increase the rate of water infiltration.

Surface compaction is also an important factor in soil management. It can result when important physical properties of the soil, such as pore space, are degraded. Soil compaction results from weight on the soil pushing the soil particles together. When compaction occurs in the surface layer or subsoil, aeration is impaired and plant roots have more difficulty pushing through the soil to reach water. Other factors that affect compaction are wet conditions and clayey textures in the surface layer and subsoil.

Management measures that improve soil tilth and minimize surface compaction include using high-residue crops in the rotation a high percentage of the time, preventing trampling by livestock during wet periods, deferring the use of equipment during wet periods, leaving as much residue as possible on or near the surface, and eliminating unnecessary tillage trips. The timing of farming activities is critical. If compaction has occurred, it can be reduced through ripping or deep plowing. Tilth and compaction are especially important on clayey soils, such as Albaton, Baltic, Blencoe, Forney, James, Onawa, Owego, Percival, and Scroll soils, and on soils that have a claypan or a sodium-affected subsoil, such as Gayville soils.

Sodium-affected soils require additional management measures. They have a slow rate of water infiltration and are less productive than other soils because they have a lower content of organic matter. The dense, compact subsoil restricts penetration by roots and moisture. Management of sodium-affected soils should include tilling in a timely manner; minimizing tillage and leaving crop residue on the surface, which helps to maintain the content of organic matter; and maintaining tilth. Rotations that include grasses and legumes help to maintain fertility, tilth, and the content of organic matter. Chiseling and subsoiling when the soil is dry can increase the rate of water infiltration.

Field crops suited to the soils and climate of the survey area include small grain and row crops. Corn and soybeans are the main row crops. Corn is grown mainly for grain, but a smaller acreage is harvested for silage. Oats and spring wheat are the main small grain crops.

All of the commonly grown and climatically adapted crops are suited to the very deep, well drained or moderately well drained soils, such as Alcester, Blake, Blyburg, Bon, Clarno, Davis, Egan, Haynie, Modale, Salix, Trent, and Wentworth soils. Delmont, Enet, Percival, and Scroll soils are better suited to early maturing small grain than to the deeper rooted, late-maturing crops, such as corn and alfalfa. The porous underlying material in these soils limits the available water capacity and the depth to which roots can develop. Albaton, Forney, and Luton soils have a clayey subsoil that retards root growth and restricts the amount of water that is released to plants. These soils are better suited to small grain and alfalfa than to row crops. Sardak, Ticonic, and Thurman soils also are better suited to small grain, which provides better protection against wind erosion than row crops.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forest land, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. The slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

About 182,000 acres in Clay County, or 68 percent of the total acreage, meets the soil requirements for prime farmland. Scattered areas of this land are throughout the county. Less than 8,000 acres of this prime farmland is irrigated. Most areas of these soils are cropped.

The map units in the survey area that are considered prime farmland are listed in table 5. This list does not constitute a recommendation for a particular land use. On some soils included in the list, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps. The soil qualities that affect use and management are described under the heading “Detailed Soil Map Units.”

Pasture and Hayland

David W. Schmidt, range conservationist, Natural Resources Conservation Service, helped prepare this section.

Pasture and hayland are used for the production of adapted domesticated perennial forage plants to be grazed by livestock or harvested for hay. These forage plants can be either native or introduced species and may be seeded alone or in mixtures. Generally, these species are established as part of a long-term forage program, but in some areas legumes or grasses have been established as part of a short-term crop rotation.

Currently, about 12 percent of the county is classified as pasture and hayland (U.S. Department of Commerce, 1992). This acreage supplies a major portion of the forage for livestock. It includes areas that formerly supported native vegetation but have been invaded by introduced tame grasses, such as smooth bromegrass, because of overgrazing. Managing these sites as native rangeland is no longer practical in many cases. Because of overgrazing, improper management, and poor agronomic practices, much of the pasture or hayland is presently producing well below its potential.

Proper management of pasture and hayland is needed to obtained sustained maximum yields. Proper stocking rates allow the pasture plants to retain their vigor. Overgrazing results in depletion of the root systems of the pasture plants. If continued overgrazing is allowed, the plants will eventually die out and be replaced by less desirable species and by weeds. A planned grazing system that includes periods of adequate rest or deferment for the key pasture species improves plant vigor and thus improves production. Including rest periods between periods of grazing allows the pasture plants to regrow and replenish their energy reserves. Harvesting hay crops at the proper stage of plant growth also helps to maintain plant vigor. Generally, the plants should be allowed to grow to early or mid bloom stage before they are harvested. Grazing pasture species at the proper stage of growth also increases production. The plants should not be grazed before they have produced enough leaf material to replenish stored energy reserves. Generally, the plants should be allowed to grow to a height of 8 to 14 inches before grazing is allowed. The proper height depends on the species being managed. If the plants become too tall or mature before grazing is allowed, the quality and quantity of the forage can be affected. Also, allowing the plants to regrow before the first killing frost provides adequate energy reserves for survival through the winter and for the initiation of regrowth in the spring. Allowing regrowth also increases the ability of the plants to trap snow, thereby increasing soil moisture.

Pasture and hayland species can be divided into two broad categories—cool-season and warm-season species. Cool-season species begin their growth in the early spring and reach maturity in early summer. If soil moisture is adequate, they may regrow in the fall when temperatures cool. Warm-season species begin growth in the early summer. They produce most of their forage during the hot summer months. Cool-season plants include smooth bromegrass, intermediate wheatgrass, and alfalfa. Warm-season species include big bluestem and switchgrass. Selecting a warm-season species will ensure a productive, nutritious forage source for livestock during July and August. Using a cool-season species would produce less forage during the same period.

Proper management includes the periodic reestablishment of pasture and hayland. The length of time that pasture and hayland remain productive depends on the plant species, the type of soil, climatic factors, and management techniques. Generally, many of the tame species should be replaced every 5 to 10 years. Native species that are adapted to the site generally remain productive for an extended period of time, depending on the kind of management applied. Species selection should be based on the type of soil and on producer needs. Using improved varieties can result in increased production, improved forage quality, and improved stand establishment and can increase the longevity of the stands.

Maintaining soil fertility is an important management concern. Applications of fertilizer should be based on the results of soil tests. Care should be taken to prevent the contamination of water supplies. Proper levels of fertilizer can increase production, increase the longevity of the stand, and improve the quality of forage. Planting legumes, such as alfalfa, in combination with grasses increases the nitrogen level and thus helps to meet the nutrient needs of grass species.

Weeds can be a problem unless proper management techniques are applied. Allowing overgrazing, selecting species that are not adapted to the site, and failing to maintain soil fertility can increase the extent of weeds in areas of pasture and hayland.

The soils in the county have been assigned to pasture suitability groups. These groups are listed in each detailed soil map unit description and in the "Interpretive Groups" section. The groups are based primarily on the suitability of the soil for certain pasture or hayland species, management needs, and potential productivity. The principal criteria for assigning a soil to a pasture suitability group include depth, drainage class, texture, structure, permeability, available water capacity, landscape position, and special internal features. Detailed interpretations for each pasture suitability group in the county are provided in the Technical Guide, which is available in the local office of the Natural Resources Conservation Service. General descriptions of the pasture suitability groups in this county are provided in the following paragraphs. The descriptions include limitations affecting the use of the soils for pasture or hayland and a list of suitable plant species. The species are selected based on yield potential, adaptability to the site, palatability, and relative ease of establishment.

Group A.—The soils in this group receive additional moisture from runoff or flooding. All climatically adapted grasses and legumes are suitable, but only plants that are capable of utilizing the extra moisture are recommended.

The soils in this group are artificially drained or have a water table that is seasonally high for only short periods. Examples are Albaton, Baltic, Blencoe, Chancellor, Forney, Lakeport, Lamo, Lex, Owego, and Whitewood soils. The species that are most suitable in areas of these soils include alfalfa, big bluestem, creeping foxtail, indiangrass, intermediate wheatgrass, reed canarygrass, smooth bromegrass, orchardgrass, and switchgrass. Maintaining plant vigor and maintaining good soil tilth are the major management concerns. Proper grazing use, including deferred grazing and timely harvesting, helps to maintain plant vigor. Applications of fertilizer may also be needed. Surface compaction may be a concern during wet periods. Deferring use during these periods helps to minimize compaction and maintain soil tilth.

Group B1.—The soils in this group receive additional moisture from runoff or flooding. Because of the excess moisture, the selection of climatically adapted grasses is limited to water-tolerant species.

The soils in this group are not artificially drained and do not have a water table that is seasonally high for prolonged periods. Examples are Clamo and Luton soils. The species that are most suitable in areas of these soils include creeping foxtail and reed canarygrass. The main management concern is surface compaction, which can result from harvesting or grazing during periods when the soils are saturated. Deferring grazing or delaying haying during these periods can minimize compaction and improve plant vigor.

Group B2.—The soils in this group receive additional moisture from runoff. Because of the excess moisture, the selection of climatically adapted grasses is limited to water-tolerant species.

The soils in this group are not artificially drained. Examples are Tetonka and Worthing soils. The species that are most suitable in areas of these soils include creeping foxtail and reed canarygrass. The major management concern is the likelihood of saturated soil conditions, which can result in surface compaction. Deferring grazing or delaying haying during wet periods can minimize compaction and improve plant vigor.

Group D1.—The soils in this group have a moderately deep root zone and a limited available water capacity. These features restrict the selection of climatically adapted grasses and legumes.

The soils in this group are excessively drained to somewhat poorly drained and are moderately deep over sand and gravel. The somewhat poorly drained soils and some of the moderately well drained soils have a water table that is seasonally high for short periods and are calcareous at or near the surface. Typical soils in this group are Enet and Grable soils. The species that are most suitable in areas of these soils include alfalfa, intermediate wheatgrass, and smooth bromegrass. The major management concerns are overcoming droughtiness, which is caused by the limited available water capacity, and maintaining plant vigor. Proper hayland management and proper grazing use, including deferred grazing or a planned grazing system, help to maintain plant vigor. Applications of fertilizer may also be needed.

Group D2.—The soils in this group have a shallow root zone and a very low available water capacity. These features limit the selection of climatically adapted grasses.

The soils in this group are excessively drained to moderately well drained and are shallow over sand and gravel. Delmont soils are examples. The species that are most suitable in areas of these soils include crested wheatgrass and pubescent wheatgrass. Maintaining the plant community can be difficult because of the extreme droughtiness and the shallow root zone. Proper grazing use, deferred grazing, a planned grazing system, and timely harvesting help to maintain plant vigor.

Group F.—The soils in this group are suited to all climatically adapted grasses and legumes, but bunch-type grass species are not recommended in areas where the slope is 6 percent or more.

The soils in this group include Blake, Blyburg, Clarno, Davis, Davison, Egan, Haynie, Modale, Salix, Wakonda, and Wentworth soils. The species that are most suitable in areas of these soils include alfalfa, big bluestem, green needlegrass, indiangrass, intermediate wheatgrass, smooth bromegrass, switchgrass, and orchardgrass. The major management concerns are maintaining plant vigor and maintaining good tilth. Proper grazing use, deferred grazing, a planned grazing system, and proper hayland management improve plant vigor, help to maintain tilth, and help to prevent surface compaction. Applications of fertilizer may also be needed.

Group G.—The soils in this group are calcareous within a depth of 10 inches. They range from gently sloping to moderately steep. The selection and productivity of climatically adapted grasses and legumes are limited by the slope, the high content of lime, and the hazard of erosion.

Betts and Ethan soils are typical of the soils in this group. The species that are most suitable in areas of these soils include alfalfa, crested wheatgrass, intermediate wheatgrass, pubescent wheatgrass, and smooth bromegrass. The major management concerns are maintaining plant vigor and controlling erosion. Proper grazing use, deferred grazing, a planned grazing system, and proper hayland management improve plant vigor and help to control erosion. Applications of fertilizer may also be needed.

Group H.—The soils in this group are susceptible to erosion. Also, a limited available water capacity restricts the selection and productivity of climatically adapted grasses and legumes.

The soils in this group include Meckling, Thurman, and Ticonic soils. The species that are most suitable in areas of these soils include alfalfa, big bluestem, indiangrass, intermediate wheatgrass, smooth bromegrass, and switchgrass. The major management concerns are maintaining plant vigor and controlling erosion. Proper grazing use, deferred grazing, a planned grazing system, and proper hayland management improve plant vigor and help to control erosion. Applications of fertilizer may also be needed.

Group I.—The soils in this group have an unfavorable root zone and a restricted rate of water infiltration. These features limit the selection and productivity of climatically adapted grasses and legumes.

The soils in this group include Lossing, Onawa, Percival, Scroll, and Vore soils. The species that are most suitable in areas of these soils include alfalfa, green needlegrass, intermediate wheatgrass, smooth bromegrass, switchgrass, and big bluestem. The major management concerns are maintaining plant vigor and maintaining good tilth. Proper grazing use, deferred grazing, a planned grazing system, and proper hayland management improve plant vigor and help to maintain tilth. Applications of fertilizer may also be needed.

Group J.—The soils in this group are characterized by excessive salinity and alkalinity. These features severely limit the selection and productivity of climatically adapted grasses and legumes.

The soils in this group include Gayville, James, and Salmo soils. The species that are most suitable in areas of these soils include tall wheatgrass and western wheatgrass. The major management concern is maintaining the desirable plant community. Surface compaction is also a concern if grazing or haying is allowed during periods when the soils are saturated. Proper grazing use, deferred grazing, and a planned grazing system help to maintain plant vigor and ensure the survival of the stand. These measures also help to maintain tilth and minimize surface compaction.

Group K.—The soils in this group receive additional moisture from runoff. They are suited to all of the climatically adapted grasses and legumes.

The soils in this group include Alcester, Bon, Dalesburg, Dimo, and Trent soils. The species that are most suitable in areas of these soils include alfalfa, big bluestem, creeping foxtail, indiangrass, intermediate wheatgrass, reed canarygrass, orchardgrass, smooth bromegrass, and switchgrass. The major management concerns are maintaining plant vigor and maintaining tilth. Proper grazing use, deferred grazing, a planned grazing system, and proper hayland management improve plant vigor, help to maintain tilth, and minimize compaction. Applications of fertilizer may also be needed.

Group NS.—The soils in this group are generally not suitable for pasture or hayland plantings because they are steep, are very shallow to gravel, are sandy and have a low content of organic matter, are very strongly saline or alkaline, are clayey and have a dense subsoil, are stony or very stony, or are subject to ponding.

Productivity Ratings and Crop Yield Estimates

Productivity ratings are relative ratings of the ability of a soil to produce a particular crop. They are useful for estimating long-term average crop yields, for comparing the production capacity of soils, and in various economic analyses. The productivity ratings of the soils in Clay County are shown in table 6.

Productivity ratings are based on soil properties that are important to crop production. The experience of soil scientists, conservationists, and university researchers is used to develop the ratings. Results from field trials and demonstrations and the records and experience of producers also are considered.

The ratings developed for this survey are comparative ratings, and they apply to the detailed soil map units in Clay County. The ratings are for local use and may differ from those developed for adjacent or nearby counties.

The data used to determine productivity ratings include crop and range yields, range composition, and other soils information published in this soil survey. Four steps are used to calculate the productivity ratings (Malo, 1996). The first step is to determine a comparative crop rating for each map unit that is suitable for crop production. In the second step, the amount of usable grass (range) forage available for each map unit is determined (total range yield x forage use value factor). Since not all native forage is usable by livestock, a forage use value factor (based on the plant species that occur) is calculated for each soil series. The third step is to determine the grass/range rating for each map unit. Grass/range ratings are equated to crop ratings by using a balance point factor. The rating is for potential palatable native vegetation. The fourth step is to determine a soil productivity rating that reflects the highest and best use for each map unit. The soil productivity rating is equal to the highest value of either the final crop rating or the grass/range rating.

Because these productivity ratings are based on comparisons of physical and chemical properties of soils, the rating of one soil relative to another soil should not change as a result of fluctuations in economic conditions or advancements in technology. Also, the potential yield advantage of one soil over another generally does not change when a new form of fertilizer, a new grain variety, a new tillage system, or a new pest management program is developed.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 7. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations also are considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 7 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the South Dakota Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, or for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit (USDA, 1961). Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations or hazards that restrict their use.

Class II soils have moderate limitations or hazards that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations or hazards that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations or hazards that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations or hazards, impractical to remove, that limit their use.

Class VI soils have severe limitations or hazards that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations or hazards that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations or hazards that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, ***e, w, s,*** or ***c***, to the class numeral, for example, IIe. The letter ***e*** shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; ***w*** shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); ***s*** shows that the soil is limited mainly because it is shallow, droughty, or stony; and ***c***, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by ***w, s,*** or ***c*** because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

The capability classification of each map unit is given in the sections “Detailed Soil Map Units” and “Interpretive Groups.”

Rangeland

David W. Schmidt, range conservationist, Natural Resources Conservation Service, helped prepare this section.

Rangeland supports native vegetation suitable for grazing or browsing. It includes areas where native vegetation has been reestablished. The vegetation is mainly grasses, grasslike plants, forbs, or shrubs. The amounts and kinds of native vegetation in any one area are determined by the soil, topography, climate, past use, and management.

All of the county was rangeland before the first permanent settlers arrived. Currently, less than 1 percent of the county supports native vegetation. This rangeland supplies a portion of the forage for livestock in the county. Approximately 27 percent of the farm and ranch income in the county is derived from the sale of livestock and livestock products (U.S. Department of Commerce, 1992). Most of the livestock enterprises are cow-calf operations. Some are yearling operations, and some combine cow herds with yearlings. This latter practice permits greater flexibility in adjusting livestock numbers during periods of drought. Sheep are raised in limited numbers throughout the county and are often run in combination with cow herds. The rangeland is generally grazed from May to October. The forage provided by rangeland is generally supplemented by crop aftermath and tame pasture plants, such as intermediate wheatgrass, orchardgrass, and smooth bromegrass. In winter the forage is supplemented by protein concentrate and hay.

Clay County is part of the tall grass prairie. The native vegetation is dominated by tall and mid grasses and forbs. Common tall grass species include big bluestem, switchgrass, and prairie dropseed. Mid grasses include little bluestem, sideoats grama, and needlegrasses. Goldenrod and prairie-clover are common forbs. The tall grass prairie consists of cool- and warm-season plants, which provide high-quality forage throughout the growing season. The cool-season plants grow mostly during April, May, and June and include such plants as porcupinegrass. The warm-season plants grow mostly during June, July, and August and include such plants as big bluestem. The cool-season grasses may start growing again in September and October if rainfall is adequate.

The native vegetation in many parts of the county is producing below its potential because of past management. The tall grasses and some of the mid grasses have been replaced by less desirable plants. In many areas of the county, the past misuse of the native vegetation has resulted in an invasion of cool-season tame grasses, such as smooth bromegrass and Kentucky bluegrass. As a result, the amount of available forage is reduced. In most areas, however, enough of the original plants remain for the reestablishment of high-quality native plants if good management practices are applied.

Range Sites and Condition Classes

Different kinds of soil vary in their capacity to produce native vegetation. Soil properties that affect moisture supply and plant nutrients have the greatest influence on the productivity of range plants. Soil reaction, salt content, and a seasonal high water table also are important. Soils that produce approximately the same kinds, amounts, and proportions of native vegetation make up a range site. The potential native vegetation on a range site is the stabilized plant community that the site is capable of producing. It consists of the plants that were growing on the site when the region was settled. This plant community maintains itself and changes very little as long as the environment remains unchanged. The relationship between soils and vegetation was ascertained during this survey; thus, range sites generally can be determined directly from the soil maps.

The plants within the native plant community are sometimes grouped as decreasers, increasers, or invaders, depending on their response to grazing pressure. Decreasers are plants that respond to overgrazing by decreasing in abundance. They generally are the most productive plants and the ones most preferred by the grazing animals. Increasers are plants that respond to grazing pressure, at least initially, by increasing in amount as the more desirable decreaser plants become less abundant. Increasers generally are less productive and less preferred by the grazing animals. Invaders are plants that are not part of the original plant community but invade because of some kind of disturbance or continued overgrazing. Some invader plants have little or no value for grazing.

Because plants do not respond in the same manner to different influences, a plant may be a decreaser on some range sites but an increaser on others. A cool-season plant, for example, may be a decreaser if the site is grazed only during the spring but would be an increaser if the same site were grazed only during the summer. The reverse would be true for the warm-season plants. Restricting grazing to the spring would cause the warm-season plants to increase in abundance, and restricting grazing to the summer would cause them to decrease.

Table 8 shows, for the soils in the survey area, the range site; the composition of species in the potential natural plant community; and the potential annual production of vegetation in favorable, average, and unfavorable years. ***Potential annual production*** is the amount of vegetation that can be expected to grow annually on well managed rangeland that is supporting the potential natural plant community. It includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year's growth of leaf, twigs, and fruits of woody plants. It does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air-dry vegetation for favorable, average, and unfavorable years. In a favorable year, the amount and distribution of precipitation and the temperature make growing conditions substantially better than average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture.

Yields are adjusted to a common percent of air-dry moisture content. The relationship of green weight to air-dry weight varies according to such factors as exposure, amount of shade, recent rains, and unseasonable dry periods.

Range management maintains the capacity of the rangeland to produce forage for livestock and game animals and to provide wildlife habitat, water, and watershed protection. The primary objective of good range management is to keep the rangeland in excellent or good condition. The main management concern is responding to important changes in the plant community of a range site.

Range condition is determined by comparing the present vegetation on a range site with the potential native plant community for the site. Four range condition classes are recognized. The range site is in ***excellent*** condition if 76 to 100 percent of the present vegetation is the same kind as the potential native vegetation. It is in ***good*** condition if the percentage is 51 to 75, in ***fair*** condition if the percentage is 26 to 50, and in ***poor*** condition if the percentage is 25 or less. The potential production depends on the range site, the range condition, and the moisture available to plants during the growing season.

Measures that maintain or improve the range condition are needed on all of the rangeland in the county. They include proper stocking rates and rotation or deferred rotation grazing systems. These systems provide rest periods that maintain or improve the vigor of the key plants. Good range management also includes range seeding, fencing, and measures that provide water for livestock.

The soils in the county are assigned to 14 different range sites. These range sites are described in the following paragraphs.

Clayey Overflow range site. The potential native vegetation on this site is a mixture of tall and mid, warm-season prairie grasses. About 50 percent of the forage is a combination of big bluestem, indiangrass, and switchgrass, which are tall, warm-season grasses. About 25 percent of the vegetation is mid, warm-season grasses, such as little bluestem and sideoats grama. Water-tolerant, tall, warm-season grasses, such as prairie cordgrass, make up about 15 percent of the vegetation in some areas. Forbs, such as stiff sunflower, heath aster, rush skeletonplant, and Missouri goldenrod, make up about 5 percent, and leadplant, wild rose, and sedges make up about 5 percent.

The major management concern on this site is maintaining the extent of the most productive grasses. Big bluestem, switchgrass, indiangrass, and stiff sunflower lose their productive capacity and thin out after continuous grazing because the livestock prefer these plants. As the extent of these plants decreases, the extent of little bluestem and sideoats grama initially increases. After continuous overgrazing, however, Kentucky bluegrass, a short, cool-season grass, becomes the principal plant on the site. Low forage production is the result. The extent of the most productive grasses can be increased or maintained by using proper stocking rates and by using a deferred grazing or rotation grazing program, which provides rest periods during the key growing season of the desirable plants.

Limy Subirrigated range site. The potential native vegetation on this site is an excellent stand of tall and mid, warm-season grasses. Little bluestem makes up about 40 percent of the vegetation. A combination of big bluestem, indiangrass, porcupinegrass, and switchgrass makes up about 45 percent of the vegetation, sideoats grama makes up 5 percent, and sedges and forbs make up 10 percent. This site is less productive than the Subirrigated site because of the seasonal high water table and the high content of lime in the soils.

The major management concern on this site is maintaining the extent of the most productive grasses. Big bluestem, indiangrass, switchgrass, and prairie dropseed lose their productive capacity and thin out after continuous grazing because the livestock prefer these plants. As the extent of these plants decreases, the extent of little bluestem and sideoats grama initially increases. After continuous overgrazing, however, Kentucky bluegrass, sedges, and downy brome become the principal plants on the site. Low forage production is the result. The extent of the most productive grasses can be increased or maintained by using proper stocking rates and by using a deferred grazing or rotation grazing program, which provides rest periods during the key growing season of the desirable plants.

Loamy Overflow range site. The potential native vegetation on this site is tall, warm-season prairie grasses. About 70 percent of the forage is a combination of big bluestem, indiangrass, and switchgrass, which are tall, warm-season grasses. Warm-season, mid grasses, such as little bluestem and sideoats grama, make up about 15 percent of the vegetation. Forbs, such as Maximilian sunflower, stiff sunflower, tall gayfeather, and goldenrod, make up about 10 percent, and leadplant, wild rose, and sedges make up about 5 percent.

The major management concern on this site is maintaining the extent of the most productive grasses. Big bluestem, switchgrass, indiangrass, Maximilian sunflower, and stiff sunflower lose their productive capacity and thin out after continuous grazing because the livestock prefer these plants. As the extent of these plants decreases, the extent of little bluestem and sideoats grama initially increases. After continuous overgrazing, however, Kentucky bluegrass, a short, cool-season grass, becomes the principal plant on the site. Low forage production is the result. The extent of the most productive grasses can be increased or maintained by using proper stocking rates and by using a deferred grazing or rotation grazing program, which provides rest periods during the key growing season of the desirable plants.

Saline Lowland range site. The potential native vegetation on this site is made up of species that have a tolerance for salinity. Cordgrasses are typically dominant and make up approximately 60 percent of the vegetation. Nuttall alkaligrass makes up about 15 percent; inland saltgrass, 10 percent; western wheatgrass, 5 percent; and sedges and forbs, 10 percent.

The major management concern on this site is maintaining the extent of the most productive plants. The plant community is very fragile. Cordgrasses rapidly lose their productive capacity and thin out after continuous grazing because livestock prefer these plants. As the extent of these plants decreases, saltgrass and foxtail barley become the principal plants on the site. Low forage production is the result. The extent of the most productive grasses can be increased or maintained by using proper stocking rates and by using a deferred grazing or rotation grazing program, which provides rest periods during the key growing season of the desirable plants.

Sands range site. The potential native vegetation on this site is dominated by tall and mid, warm-season grasses. Sand bluestem, prairie sandreed, little bluestem, and switchgrass are the dominant species. They make up approximately 75 percent of the vegetation. Porcupinegrass and needleandthread are the major cool-season species. They generally make up less than 15 percent of the vegetation. Blue grama and sedges are the understory species and make up only a small percentage. Forbs, such as stiff sunflower, scurfpea, and prairie clover, and shrubs, such as leadplant and wild rose, are common but generally do not make up more than 10 percent of the vegetation.

The major management concern on this site is maintaining the most productive plants. If the productive plants are removed, severe wind erosion may occur, producing areas commonly referred to as "blowouts." Sand bluestem, little bluestem, prairie sandreed, and switchgrass lose their productive capacity after continued overgrazing because the livestock prefer these plants. When the extent of these plants decreases, the extent of short grasses, such as blue grama, Scribners panicum, and sedges, increases. Low forage production is the result. The extent of the most productive grasses can be maintained by using proper stocking rates and by using a rotation grazing or deferred grazing program, which provides rest periods during the key growing season of these plants. Distributing livestock evenly across the range by providing adequate cross-fencing and water development improves utilization of the site and reduces the hazard of blowouts.

Sandy range site. The potential native vegetation on this site is dominated by tall and mid, warm-season grasses. Big bluestem, sand bluestem, prairie sandreed, and switchgrass make up about 45 percent of the vegetation. Sideoats grama and little bluestem make up about 25 percent. Needleandthread and porcupinegrass, which are cool-season grasses, make up about 20 percent. Forbs, such as heath aster, scurfpea, and perennial sunflowers, and shrubs, such as wild rose and leadplant, make up about 10 percent.

The major management concern on this site is maintaining the extent of the most productive grasses. The extent of sand bluestem, switchgrass, and porcupinegrass decreases after continuous grazing because the livestock prefer these plants. The extent of prairie sandreed, needleandthread, little bluestem, and sideoats grama initially increases as that of the other grasses decreases. After continuous overgrazing, these grasses thin out and are replaced by blue grama and Kentucky bluegrass. Low forage production is the result. The extent of the most productive grasses can be increased or maintained by using proper stocking rates and by using a deferred grazing or rotation grazing program, which provides rest periods during the key growing season of these plants.

Shallow Marsh range site. This site is ponded in spring and early summer. The potential native vegetation consists of water-tolerant, tall prairie grasses and sedges. Bluejoint reedgrass and slough sedge make up about 70 percent of the vegetation. Cattails, common spikesedge, and prairie cordgrass make up about 20 percent. Forbs, such as smartweed and waterplantain, make up about 10 percent.

The major management concern on this site is maintaining the extent of the most productive plants. After continued overgrazing, bluejoint reedgrass and slough sedge are replaced by spikesedge and other grasslike plants. An increase in the abundance of the less palatable vegetation results in a loss of available forage. The extent of the most productive plants can be maintained by using proper stocking rates and by using a deferred grazing program, which provides rest periods during the key growing season of these plants.

Shallow to Gravel range site. The potential native vegetation on this site is mid prairie grasses. Needleandthread, which is a cool-season grass, makes up about 30 percent of the vegetation. Warm-season grasses make up about 50 percent. They include little bluestem, plains muhly, sideoats grama, and prairie dropseed, which make up 40 percent of the vegetation, and blue grama and hairy grama, which make up 10 percent. Sedges, forbs, and shrubs make up about 20 percent of the vegetation.

The major management concern on this site is maintaining the extent of the most productive grasses. Needleandthread, little bluestem, plains muhly, sideoats grama, and prairie dropseed rapidly thin out after continuous overgrazing. When the extent of these grasses decreases, the extent of sedges, blue grama, and hairy grama increases. If overgrazing continues, the productivity of the site is greatly reduced. The extent of the most productive grasses can be maintained by using proper stocking rates and by using a rotation grazing or deferred grazing program, which provides rest periods during the key growing season of these plants.

Silty range site. The potential native vegetation on this site is tall and mid grasses and a large number of forbs. Cool-season grasses make up about 20 percent of the vegetation. They include green needlegrass, porcupinegrass, and western wheatgrass. Warm-season grasses, such as little bluestem, big bluestem, prairie dropseed, switchgrass, and indiangrass, make up about 60 percent of the vegetation. Forbs, such as blacksamson, dotted gayfeather, stiff sunflower, heath aster, and prairie clover, and shrubs, such as leadplant, rose, and western snowberry, make up about 20 percent.

The major management concern on this site is maintaining the extent of the most productive grasses. If continuous grazing is allowed, the extent of big bluestem, indiangrass, prairie dropseed, porcupinegrass, and green needlegrass decreases because the livestock prefer these plants. The extent of little bluestem and sideoats grama initially increases after continuous grazing. If continuous overgrazing is allowed, however, short grasses, such as blue grama, annual bromes, and Kentucky bluegrass, become the dominant plants. Low forage production is the result. The extent of the most productive grasses can be increased or maintained by using proper stocking rates and by using a deferred grazing or rotation grazing program, which provides rest periods during the key growing season of the desirable plants.

Subirrigated range site. The potential native vegetation on this site is dominantly tall, warm-season grasses. Big bluestem is the dominant warm-season grass. It makes up about 60 percent of the vegetation. Prairie cordgrass, switchgrass, indiangrass, and little bluestem make up about 20 percent. Forbs and sedges make up about 20 percent. Forbs that grow on this site include American licorice, Maximilian sunflower, downy gentian, Canada milkvetch, heath aster, and Missouri goldenrod.

The major management concern on this site is maintaining the extent of the most productive tall grasses. After continuous grazing, the extent of big bluestem, indiangrass, switchgrass, and forbs, such as Maximilian sunflower, decreases because the livestock prefer these plants. The extent of little bluestem, sideoats grama, and sedges initially increases after continuous grazing. If continuous overgrazing is allowed, however, short grasses, such as Kentucky bluegrass and downy brome, and sedges become the dominant plants. Low forage production is the result. The extent of the most productive tall grasses can be maintained by using proper stocking rates and by using a rotation grazing or deferred grazing program, which provides rest periods during the key growing season of these plants.

Thin Upland range site. The potential native vegetation on this site is tall and mid grasses and a large number of forbs. Warm-season grasses make up 65 percent of the vegetation. These include little bluestem, which makes up 30 percent of the vegetation; prairie dropseed, big bluestem, and plains muhly, 25 percent; and sideoats grama, 10 percent. Cool-season grasses, such as green needlegrass, porcupinegrass, and needleandthread, make up about 15 percent. Forbs, such as pasqueflower, dotted gayfeather, and blacksamson, and woody plants, such as leadplant and rose, make up about 20 percent.

The major management concern on this site is maintaining the extent of the most productive grasses. Indiangrass, prairie dropseed, big bluestem, porcupinegrass, and plains muhly lose their productive capacity and thin out after continuous grazing because the livestock prefer these plants. The extent of little bluestem, sideoats grama, and needleandthread initially increases as the other grasses thin out. After continuous overgrazing, short grasses, such as blue grama, dominate the site. Low forage production is the result. The extent of the most productive grasses can be increased or maintained by using proper stocking rates and by using a deferred grazing or rotation grazing program, which provides rest periods during the key growing season of the desirable plants.

Very Shallow range site. The potential native vegetation on this site is mid and short grasses. Needleandthread, plains muhly, and sideoats grama are the dominant mid grasses. They make up about 50 percent of the vegetation. Short grasses, such as blue grama and hairy grama, and sedges make up about 30 percent. Forbs, such as dotted gayfeather, blacksamson, and sagewort, and shrubs, such as leadplant and rose, make up about 20 percent.

The main management concern on this site is maintaining a good stand of grasses. If overgrazing is allowed, the site rapidly deteriorates to a stand of grama grasses, threadleaf sedge, and a few unpalatable forbs. If overgrazing continues, the stand of short grasses may thin out and much of the site is subject to erosion. A productive cover of grasses can be maintained by using proper stocking rates and by using a deferred grazing or rotation grazing program, which provides rest periods during the key growing season of the desirable plants.

Wetland range site. This range site has the potential to produce a luxuriant stand of grasses that tolerate a high water table. Because areas of this site are often under water during the spring, their use is limited to summer and fall. Prairie cordgrass is the dominant species. It makes up about 70 percent of the vegetation. Reedgrasses, reed canarygrass, switchgrass, Canada wildrye, bluegrasses, and sedges also grow on this site. They generally make up less than 30 percent of the vegetation. Forbs, such as asters, waterhemlock, and giant goldenrod, and shrubs, such as false indigo and willows, also occur but make up only a small percentage of the vegetation.

The major management concern on this site is maintaining the most productive plants. If continued overgrazing is allowed, the stand of climax grasses loses vigor and density and sedges, rushes, Kentucky bluegrass, and saltgrass increase or invade. A less productive plant community is the result. The most productive grasses can be maintained by using proper stocking rates and by using a rotation grazing or deferred grazing program, which provides rest periods during the key growing season of these plants.

Wet Meadow range site. This range site has the potential to produce a luxuriant stand of sedges and mid or tall grasses. Sedges, such as woolly sedge, are abundant. Prairie cordgrass, reedgrasses, fowl bluegrass, and reed canarygrass commonly occur in significant quantities. Forbs, such as smartweed and false aster, occur in small quantities. Shrubs and trees are rare.

The major management concern on this site is maintaining the most productive plants. If continued overgrazing is allowed, the stand of climax grasses and the more palatable sedges decrease, the less palatable sedges and rushes increase, and weedy grasses, such as foxtail barley, invade. Reduced forage production is the result. The most productive grasses can be maintained by using proper stocking rates and by using a rotation grazing or deferred grazing program, which provides rest periods during the key growing season of these plants.

Native Woodland, Windbreaks, and Environmental Plantings

Gregory F. Yapp, forester, Natural Resources Conservation Service, helped prepare this section.

Native trees and shrubs grow on about 2,895 acres in Clay County (U.S. Department of Commerce, 1992). The soils that support trees and shrubs are not classified as woodland soils; rather, they are grassland soils and formed under a grassland influence. Prior to the permanent settlement of the area, periodic fires prevented the widespread establishment of trees and shrubs. Since settlement has occurred and fire-control measures have been adopted, trees and shrubs have become established in some areas.

Soils associated with native trees and shrubs occur in two general areas of the county. These areas are on the flood plains along the Missouri and Vermillion Rivers and in the steep uplands adjacent to the flood plains. Soils on flood plains, such as Baltic, Chaska, Grable, Haynie, and Lamo soils, have generally been cleared for agriculture. The species of trees and shrubs on the flood plains include eastern cottonwood, eastern redcedar, smooth sumac, American basswood, slippery elm, hackberry, sandbar willow, Missouri River willow, peachleaf willow, prickly ash, American elm, gray dogwood, boxelder, poison ivy, gooseberry, bittersweet, wild grape, and green ash.

On Betts, Clarno, and Ethan soils in the uplands adjacent to the flood plains along the Vermillion and Missouri Rivers, common species include bur oak, common chokecherry, American plum, gray dogwood, green ash, boxelder, American elm, eastern redcedar, smooth sumac, and western snowberry. Eastern cottonwood also grows in the upland drainageways in these areas.

Farmstead and feedlot windbreaks are planted to protect buildings and livestock from the severe winter weather that is common in Clay County. In addition, these plantings provide winter cover for wildlife. They also help to beautify and screen houses and to abate noise. Farmstead and feedlot windbreaks generally consist of multiple rows of adapted trees and shrubs. Many of the older plantings in the county have been neglected and are in need of renovation. Renovation may include planting additional trees adjacent to the existing windbreaks and controlling grasses within the older windbreaks. Competition from grass species, such as smooth bromegrass, is a major factor contributing to the decline of windbreaks in Clay County. Plant competition can be controlled with herbicides or tillage.

To ensure plant survival, locally adapted planting stock should be used and planted in a properly prepared site. If possible, the site should be one on which summer fallowing was practiced during the year prior to planting.

Grazing is detrimental to windbreaks and environmental plantings. Livestock compact the soil and remove the lower branches of trees and shrubs, thereby reducing the effectiveness of the windbreaks.

Table 9 shows the height that locally adapted trees and shrubs are expected to reach in 20 years on the various soils in Clay County. The estimates in the table are based on measurements and observations of established plantings that have received adequate care.

Additional information on the planting and care of trees can be obtained from local offices of the Natural Resources Conservation Service, the South Dakota Cooperative Extension Service, or the South Dakota Division of Forestry.

At the end of each map unit description under the heading “Detailed Soil Map Units” and in the section “Interpretive Groups,” the soils are assigned to windbreak suitability groups. A windbreak suitability group is a distinctive group of soils that support trees and shrubs having similar growth and survival rates if weather conditions are normal and the windbreak is properly managed. The relationship between the soils and the growth of trees and shrubs was ascertained during this survey. Soil properties that affect moisture supply and plant nutrients have the greatest influence on the growth of trees and shrubs. Soil reaction, salt content, and a seasonal high water table also are important. The windbreak suitability groups in this survey area are described in the following paragraphs.

Group 1. The soils in this group are well suited to all types of woody plantings. They are on high flood plains, valley flats, and footslopes. They receive additional moisture from runoff and flooding. Some areas are subirrigated. All climatically suited trees and shrubs have the potential to grow well.

This group consists mainly of loamy, silty, and clayey, somewhat poorly drained to well drained soils that are very deep or deep. Available water capacity is moderate or high. The fine sandy loams and loamy fine sands are subject to severe wind erosion. Typical soils are Alcester, Blyburg, Bon, Dalesburg, Davis (flooded), Dimo, Enet (flooded), Lakeport, Owego, and Trent soils.

Group 1K. The soils in this group are well suited to all types of woody plantings. They are on high flood plains, valley flats, and footslopes. They receive additional moisture from runoff and flooding. Some areas are subirrigated. All climatically suited trees and shrubs have the potential to grow well.

This group consists mainly of loamy, silty, and clayey, somewhat poorly drained to well drained soils that are very deep or deep. The soils are calcareous. Available water capacity is moderate or high. The fine sandy loams and loamy fine sands are subject to severe wind erosion. Typical soils are Blake, Chaska, Davison, Grable, Haynie, Lossing, Meckling, Modale, Onawa, Percival, Roxbury, Storla, Wakonda, and Vore soils.

Group 2. The soils in this group are well suited to woody plantings. They are on toeslopes, valley flats, backswamps, high flood plains, and low flood plains. They receive additional moisture from runoff or have a high water table within the root zone. Wetness limits the selection of species suitable for planting on these soils. All climatically suited trees and shrubs have the potential to grow well.

This group consists of very deep and deep, silty, loamy, and clayey, poorly drained and somewhat poorly drained soils. Available water capacity is high. The soils may be excessively wet or ponded during the spring or during overflow periods. The sandy loams and loamy fine sands are subject to severe wind erosion. Typical soils are Chancellor, Blencoe, Forney, Luton, and Whitewood soils.

Group 2K. The soils in this group are well suited to woody plantings. They are on toeslopes, valley flats, backswamps, high flood plains, and low flood plains. They receive additional moisture from runoff or have a high water table within the root zone. Wetness limits the selection of species suitable for planting on these soils. All climatically suited trees and shrubs have the potential to grow well.

This group consists of very deep and deep, silty, loamy, and clayey, poorly drained and somewhat poorly drained soils. The soils are calcareous. Available water capacity is high. The soils may be excessively wet or ponded during the spring or during overflow periods. The sandy loams and loamy fine sands are subject to severe wind erosion. Typical soils include Albaton, Baltic, Lamo, and Lex soils.

Group 3. The soils in this group are well suited to woody plantings. They are on high flood plains, footslopes, backslopes, and summits. Except for species that require abundant moisture, all climatically suited trees and shrubs have the potential to grow well.

This group consists of very deep and deep, loamy and silty, well drained soils. Available water capacity is moderate or high. The susceptibility to water erosion ranges from slight in the nearly level areas to severe in the strongly sloping areas. The susceptibility to wind erosion ranges from slight to severe. Typical soils are Clarno, Davis, Egan, Salix, and Wentworth soils.

Group 4. The soils in this group are fairly well suited to woody plantings. Most of the climatically suited trees and shrubs grow well, but maximum growth is not possible because of restricted root development.

This group consists of moderately deep, deep, and very deep, clayey soils and clayey soils that have a surface layer of loamy or silty material. The soils are moderately well drained and well drained. Available water capacity is low or moderate in the more clayey soils and moderate or high in the silty and loamy soils. Soils having accumulations of salts in the lower part of the subsoil also are in this group. The clayey soils are subject to severe wind erosion. The moderately sloping and strongly sloping soils are subject to severe water erosion. None of the soils in Clay County are assigned to this group.

Group 5. The soils in this group are well suited to woody plantings. They are on backslopes and valley flats. All climatically suited trees and shrubs have the potential to grow well, except those that require abundant moisture.

This group consists mainly of very deep, loamy and sandy, well drained and somewhat excessively drained soils. Available water capacity generally is low or moderate. The soils are subject to severe or very severe wind erosion. Typical soils are Thurman and Ticonic soils.

Group 6G. The soils in this group are poorly suited to woody plantings. They are on backslopes, footslopes, and valley flats. No trees and shrubs grow well on the soils in this group. Plantings can be established, but optimum survival and growth should not be expected. Field windbreaks are not effective because of the slow growth rate and the low height at maturity.

This group consists of silty and loamy, well drained and somewhat excessively drained soils that are moderately deep to bedrock or are shallow or moderately deep to sand and gravel. Available water capacity is low or moderate. The moderately sloping and strongly sloping soils are subject to severe erosion. Typical soils include Delmont, Enet, and Scroll soils.

Group 7. The soils in this group are poorly suited to woody plantings. They are on high flood plains. No trees or shrubs grow well. Coniferous trees and shrubs are better suited than deciduous trees and shrubs. Plantings can be established, but optimum survival and growth should not be expected. Field windbreaks are not effective because of the slow growth rate and the low height at maturity.

This group consists of moderately deep, deep, and very deep, sandy, somewhat excessively drained and excessively drained soils. Available water capacity is very low or low. The soils are subject to very severe wind erosion. Typical soils are Sardak and Thurman soils.

Group 8. The soils in this group are poorly suited to woody plantings. They are on shoulder slopes. No trees and shrubs grow well. Plantings can be established, but optimum survival and growth should not be expected. Field windbreaks are not effective because of the slow growth rate and the low height at maturity.

This group consists of moderately deep, deep, and very deep, loamy and silty, well drained soils that contain enough calcium carbonate at or near the surface to adversely affect the growth and survival of trees and shrubs. Available water capacity is moderate or high. The soils are subject to severe wind erosion and water erosion. Typical soils include Betts and Ethan soils.

Group 9W. The soils in this group are poorly suited to woody plantings. They have a dense claypan subsoil and an excess amount of salt in the lower part of the subsoil. They are on high flood plains. No trees and shrubs grow well because of the adverse effects of the dense claypan subsoil and the salts.

This group consists of very deep, silty and loamy, moderately well drained soils that have a seasonal high water table. Available water capacity is low or moderate. Gayville soils are typical of the soils in this group.

Group 10. The soils in this group generally are unsuited to woody plantings. They are shallow to bedrock, very shallow to gravel, very saline, very alkaline, stony, very steep, or very wet. Specialized plantings for wildlife, recreation, or beautification may be established in some areas. The most favorable sites should be selected, and only those trees and shrubs that have the best potential to survive and grow should be planted.

The soils in this group have a wide range of texture, depth, drainage, available water capacity, permeability, and slope characteristics. Susceptibility to water erosion and wind erosion ranges from slight to very severe. Typical soils are Albaton, Betts, Clamo, Ethan, James, Napa, Norway, Salmo, Talmo, Tetonka, Thurman, and Worthing soils.

Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from local offices of the Natural Resources Conservation Service or the South Dakota Cooperative Extension Service or from a commercial nursery.

Recreation

The soils of the survey area are rated in table 10 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 10, the degree of soil limitation is expressed as slight, moderate, or severe. ***Slight*** means that soil properties are generally favorable and that limitations are minor and easily overcome. ***Moderate*** means that limitations can be overcome or alleviated by planning, design, or special maintenance. ***Severe*** means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or a combination of these measures.

The information in table 10 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 13 and interpretations for dwellings without basements and for local roads and streets in table 12.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Wildlife Habitat

Connie M. Vicuna, biologist, Natural Resources Conservation Service, helped prepare this section.

Clay County provides a variety of wildlife habitat types, including rangeland, cropland, and wetlands. Wildlife species include whitetail deer, gray partridge, doves, cottontail rabbits, squirrels, pheasants, ducks, geese, other waterbirds, beaver, mink, muskrats, fox, coyotes, raccoon, and skunks. Bobwhite quail also inhabit the survey area. Fisheries in the county are associated with a few dams and the Missouri and Vermillion Rivers.

Wetlands are numerous throughout Clay County, including both potholes and areas on flood plains along many streams. Wetlands range in size from less than 0.1 acre to more than 1,000 acres. Water regimes are equally variable and include temporary and permanent waters. The great diversity and number of wetlands make this area extremely attractive to waterfowl from spring through fall.

Rangeland habitat is common in the steep, rolling hills associated with the breaks of the two major rivers. These grassland areas, in conjunction with the numerous intermixed wetlands, provide important habitat for waterfowl production.

Woody habitat in the county is on flood plains and the adjacent slopes and around the margins of some wetland areas. Although they are not abundant, these shrubby and wooded areas are very important for many wildlife species. They provide either food or cover during some part of the year.

Soils affect the kind and amount of vegetation that is available for wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 11, the soils in the survey area are rated according to their potential for providing specific elements of wildlife habitat. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining the habitat elements; and in determining the intensity of management needed for each habitat element.

The potential of the soil is rated good, fair, poor, or very poor. A rating of ***good*** indicates that the element is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of ***fair*** indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of ***poor*** indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of ***very poor*** indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. They are primarily food sources for wildlife, but small grain crops also provide some nesting cover. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, salinity, slope, surface stoniness, ponding, and flooding. Soil temperature and soil moisture also are considerations. Examples of grain and seed crops are corn, soybeans, wheat, and oats.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. They provide nesting and roosting cover. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, salinity, surface stoniness, ponding, flooding, and slope. Soil temperature and soil moisture also are considerations. Examples of grasses and legumes are intermediate wheatgrass, bromegrass, and alfalfa.

Native herbaceous plants are native or naturally established grasses and forbs, including weeds. They provide food, nesting cover, and escape cover. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, salinity, surface stoniness, ponding, and flooding. Soil temperature and soil moisture also are considerations. Examples of wild herbaceous plants are big bluestem, switchgrass, indiangrass, green needlegrass, and sideoats grama.

Planted woody plants include trees and shrubs that require cultivation before and during establishment. These plants provide fruit, buds, twigs, bark, and foliage and are important as food sources, nesting cover, winter cover, and escape cover. Soil properties and features that affect the growth of trees and shrubs are depth of the root zone, available water capacity, salinity, and soil moisture. Examples of planted woody plants are green ash, hackberry, caragana, plum, chokecherry, Rocky Mountain juniper, and eastern redcedar.

Native deciduous trees and woody understory produce nuts or other fruit, buds, twigs, bark, and foliage. They provide food for wildlife and are important as winter cover and escape cover. Soil properties and features that affect the growth of these trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are elm, cottonwood, ash, bur oak, willow, plum, and chokecherry.

Native coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Eastern redcedar is the primary example of these plants in the survey area.

Native shrubs are bushy woody plants that produce fruit, buds, twigs, bark, and foliage. Soil properties and features that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and soil moisture. Examples of shrubs are gooseberry, wild grape, and sumac.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. They provide food and nesting cover. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, cattails, sloughgrass, whitetop, cordgrass, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

Information concerning maintaining and managing specific wildlife species is available at the local office of the Natural Resources Conservation Service; the South Dakota Department of Game, Fish, and Parks; or the United States Fish and Wildlife Service.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the data in the tables described under the heading “Soil Properties.”

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data

generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 12 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, and local roads and streets. The limitations are considered ***slight*** if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; ***moderate*** if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and ***severe*** if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and ***small commercial buildings*** are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrinking and swelling, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic-supporting capacity.

Sanitary Facilities

Table 13 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered ***slight*** if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; ***moderate*** if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and ***severe*** if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 13 also shows the suitability of the soils for use as daily cover for landfill. A rating of ***good*** indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; ***fair*** indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and ***poor*** indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 13 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation should be considered.

The ratings in table 13 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to wind erosion.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 14 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated ***good, fair,*** or ***poor*** as a source of roadfill and topsoil. They are rated as a ***probable*** or ***improbable*** source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavation and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated ***good*** contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated ***fair*** are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones or have a water table at a depth of 1 to 3 feet. Soils rated ***poor*** have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent; are wet; or have a water table at a depth of less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and ***gravel*** are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 14, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table showing engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated ***good*** have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated ***fair*** are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated ***poor*** are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal high water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 15 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and for embankments, dikes, and levees. The limitations are considered ***slight*** if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; ***moderate*** if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and ***severe*** if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and the potential for frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind erosion or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

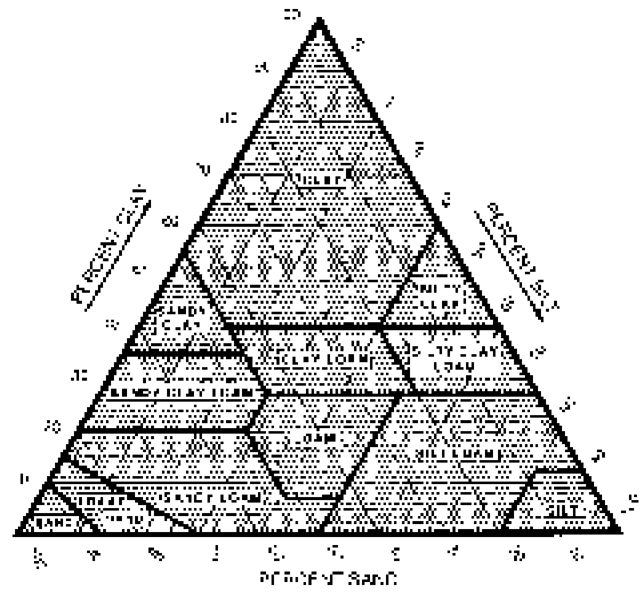

Figure 18.—Percentages of clay, silt, and sand in the basic USDA soil textural classes.

Engineering Index Properties

Table 16 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under the heading “Soil Series and Their Morphology.”

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter (fig. 18). “Loam,” for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, “gravelly.” Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (ASTM, 2001) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2000).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and ***plasticity index*** (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 17 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $^{1}/_{3}$-bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The classes are ***low***, a change of less than 3 percent; ***moderate***, 3 to 6 percent; ***high***, 6 to 9 percent; and ***very high***, greater than 9 percent.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.02 to 0.64. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to wind erosion in cultivated areas. The groups indicate the susceptibility of soil to wind erosion. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are as follows:

1. Coarse sands, sands, fine sands, and very fine sands.

2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, ash material, and sapric soil material.

3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay.

5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material.

6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay.

7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material.

8. Soils that are not subject to wind erosion because of coarse fragments on the surface or because of surface wetness.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 17, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 18 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of very deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep to very deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to two hydrologic groups in table 18, the first letter is for drained areas and the second is for undrained areas.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Table 18 gives the frequency and duration of flooding and the time of year when flooding is most likely. Because of manmade flood-control structures, most of the soils on the flood plain along the Missouri River are very rarely flooded. Flooding is very unlikely in these areas unless the dams fail.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, very rare, rare, occasional, and frequent. ***None*** means that flooding is not probable; ***very rare*** that it is very unlikely but possible under extremely unusual weather conditions; ***rare*** that it is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year); ***occasional*** that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); and ***frequent*** that it occurs often under normal weather conditions (the chance of flooding is more than 50 percent in any year). Duration is expressed as ***very brief*** if less than 2 days, ***brief*** if 2 to 7 days, ***long*** if 7 days to 1 month, and ***very long*** if more than 1 month. Probable dates are expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The estimates are based mainly on observations of the water table at selected sites and on the evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. Indicated in table 18 are the depth to the seasonal high water table; the kind of water table—that is, perched or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 18.

An ***apparent*** water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A ***perched*** water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Two numbers in the column showing depth to the water table indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. “More than 6.0” indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as ***low, moderate,*** or ***high***, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as ***low, moderate,*** or ***high***. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (Soil Survey Staff, 1999). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 19 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Twelve soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in ***sol***. An example is Mollisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquoll (***Aqu***, meaning water, plus ***oll***, from Mollisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Endoaquolls (***Endo***, meaning endosaturation, plus ***aquoll***, the suborder of the Mollisols that has an aquic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. An example is Cumulic Endoaquolls.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineralogy class, soil temperature regime, soil depth, and reaction class. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-silty, mixed (calcareous), mesic Cumulic Endoaquolls.

SERIES. The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the “Soil Survey Manual” (Soil Survey Division Staff, 1993). Many of the technical terms used in the descriptions are defined in “Soil Taxonomy” (Soil Survey Staff, 1999) and in “Keys to Soil Taxonomy” (Soil Survey Staff, 1996). Unless otherwise indicated, matrix colors in the descriptions are for dry soil. Following the pedon description is the range of important characteristics of the soils in the series.

Albaton Series

Depth to bedrock: Very deep
Drainage class: Poorly and very poorly drained
Permeability: Very slow
Landform: Flood plains
Parent material: Alluvium
Slope range: 0 to 2 percent

Typical Pedon

Albaton silty clay (fig. 19), 0 to 2 percent slopes, 2,258 feet south and 1,720 feet east of the northwest corner of sec. 34, T. 92 N., R. 51 W.

Ap—0 to 9 inches; dark grayish brown (2.5Y 4/2) silty clay, very dark grayish brown (2.5Y 3/2) moist; few fine prominent dark yellowish brown (10YR 4/4) redox concentrations in the lower part; moderate fine and medium subangular blocky structure; hard, firm, sticky and plastic; few fine and common very fine roots; few fine and very fine tubular pores; very slight effervescence; slightly alkaline; abrupt smooth boundary.

Cg—9 to 80 inches; grayish brown (2.5Y 5/2) silty clay with thin strata of silty clay loam, silt loam, and very fine sandy loam; dark grayish brown (2.5Y 4/2) moist; common fine and medium prominent yellowish brown (10YR 5/6) and common fine and medium prominent dark yellowish brown (10YR 4/4) redox concentrations; common prominent gray (5Y 5/1) strata of silty clay $^{1}/_{8}$ to $^{3}/_{8}$ inch in thickness; horizontal cleavage planes between strata result in some platy structure parting to moderate fine subangular blocky; hard, firm, sticky and plastic; few strata of silt loam or silty clay loam $^{1}/_{8}$ inch to 2 inches thick below a depth of 50 inches; few very fine roots throughout the upper part; few fine and common very fine tubular pores; few medium carbonate concretions; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 6 to 9 inches
Depth to carbonates: 0 to 9 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: More than 60 inches

A horizon:
Hue—10YR or 2.5Y
Value—4 (3 moist)
Chroma—1 or 2
Texture—silty clay or clay
Other features—silty clay loam or silt loam overwash in some pedons

Cg horizon:
Hue—5Y or 2.5Y
Value—5 (4 moist)
Chroma—1 or 2
Texture—silty clay with thin strata of silty clay loam, silt loam, and very fine sandy loam
Other features—fine sand below a depth of 60 inches in some pedons

Alcester Series

Depth to bedrock: Very deep
Drainage class: Moderately well drained
Permeability: Moderate
Landform: Alluvial terraces or colluvial fans
Parent material: Alluvium or colluvium
Slope range: 0 to 2 percent

Typical Pedon

Alcester silty clay loam, 0 to 2 percent slopes, 1,150 feet west and 395 feet north of the southeast corner of sec. 2, T. 95 N., R. 52 W.

Ap—0 to 6 inches; very dark gray (10YR 3/1) silty clay loam, black (10YR 2/1) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine and common very fine roots throughout; few fine and very fine tubular pores; slightly acid; abrupt smooth boundary.

A—6 to 13 inches; very dark gray (10YR 3/1) silty clay loam, black (10YR 2/1) moist; moderate fine and medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine and very fine roots throughout; few fine and very fine tubular pores; slightly acid; clear smooth boundary.

Bw1—13 to 25 inches; dark gray (10YR 4/1) silty clay loam, black (10YR 2/1) moist; weak coarse prismatic structure parting to moderate medium subangular blocky; hard, friable, slightly sticky and slightly plastic; few very fine roots throughout; few fine and very fine tubular pores; neutral; clear wavy boundary.

Bw2—25 to 38 inches; dark gray (10YR 4/1) silty clay loam, very dark gray (10YR 3/1) moist; few fine distinct dark yellowish brown (10YR 4/4) redox concentrations; weak coarse prismatic structure parting to moderate medium subangular blocky; hard, friable, slightly sticky and slightly plastic; few very fine roots throughout; few fine and common very fine tubular pores; few fine iron-manganese concretions in the lower part; neutral; abrupt smooth boundary.

Bk—38 to 58 inches; gray (10YR 5/1) clay loam, dark gray (10YR 4/1) moist; common fine prominent dark brown (7.5YR 3/3) redox concentrations; moderate fine and medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine and very fine tubular pores; few fine iron-manganese concretions; many fine and common medium soft masses of carbonate;

common medium carbonate concretions; strong effervescence; moderately alkaline; abrupt smooth boundary.

Ab—58 to 71 inches; dark gray (10YR 4/1) clay loam, very dark gray (10YR 3/1) moist; common fine prominent dark brown (7.5YR 3/2) redox concentrations; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine and common very fine tubular pores; common fine soft masses of carbonate; strong effervescence; moderately alkaline; clear wavy boundary.

C—71 to 80 inches; light olive brown (2.5Y 5/3) silty clay loam, olive brown (2.5Y 4/3) moist; many fine and common medium distinct very dark grayish brown (2.5Y 3/2) and few fine prominent dark yellowish brown (10YR 3/4) redox concentrations; massive; hard, friable, slightly sticky and slightly plastic; common very fine tubular pores; few fine soft masses of carbonate; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 24 to 60 inches
Depth to carbonates: 36 to 60 inches
Depth to contrasting parent material: 40 to more than 60 inches over clayey alluvium
Depth to gypsum and other visible salts: More than 60 inches
Other features: Some pedons do not have a buried A horizon. Some pedons do not have a C horizon.

A horizon:
Hue—10YR
Value—3 or 4 (2 or 3 moist)
Chroma—1 or 2
Texture—silty clay loam or silt loam

Bw horizon:
Hue—10YR or 2.5Y
Value—3 to 5 (2 to 4 moist)
Chroma—1 to 3
Texture—silt loam or silty clay loam

Bk horizon:
Hue—10YR or 2.5Y
Value—5 or 6 (3 to 5 moist)
Chroma—1 to 4
Texture—dominantly silty clay loam or silt loam; loam or clay loam in some pedons

C horizon:
Hue—10YR or 2.5Y
Value—5 or 6 (3 to 5 moist)
Chroma—1 to 4
Texture—dominantly silty clay loam or silt loam; loam or clay loam in some pedons

Baltic Series

Depth to bedrock: Very deep
Drainage class: Poorly drained
Permeability: Slow
Landform: Flood plains
Parent material: Alluvium
Slope range: 0 to 1 percent

Typical Pedon

Baltic silty clay loam, 0 to 1 percent slopes, 2,680 feet west and 280 feet north of the southeast corner of sec. 1, T. 94 N., R. 52 W.

Ap—0 to 6 inches; very dark gray (10YR 3/1) silty clay loam, black (10YR 2/1) moist; few fine dark yellowish brown (10YR 3/4) oxidized concentrations along root channels; moderate medium subangular blocky structure; hard, friable, sticky and plastic; few fine and very fine roots throughout; few fine and very fine tubular pores; slight effervescence; moderately alkaline; abrupt smooth boundary.

A—6 to 18 inches; very dark gray (10YR 3/1) silty clay loam, black (10YR 2/1) moist; few fine dark yellowish brown (10YR 3/4) oxidized concentrations along root channels; moderate medium subangular blocky structure; hard, friable, sticky and plastic; few fine and very fine roots throughout; few fine and very fine tubular pores; slight effervescence; moderately alkaline; clear smooth boundary.

Byzg—18 to 25 inches; very dark gray (5Y 3/1) silty clay loam, black (5Y 2.5/1) moist; moderate fine and medium subangular blocky structure; very hard, firm, sticky and plastic; few fine and very fine roots throughout; few fine and common very fine tubular pores; common fine masses of gypsum and other salts; few fine soft masses of carbonate; strong effervescence; moderately alkaline; clear smooth boundary.

Bg—25 to 45 inches; very dark gray (5Y 3/1) silty clay loam, black (5Y 2.5/1) moist; moderate fine and medium subangular blocky structure; very hard, firm, sticky and plastic; few very fine roots throughout; few fine and many very fine tubular pores; few fine soft masses of carbonate; slight effervescence; moderately alkaline; clear wavy boundary.

Bkg—45 to 56 inches; dark gray (5Y 4/1) silty clay loam, black (5Y 2.5/1) moist; moderate medium subangular blocky structure; very hard, firm, sticky and plastic; few very fine roots throughout; few fine and many very fine tubular pores; many fine soft masses of carbonate; violent effervescence; moderately alkaline; clear wavy boundary.

Cg—56 to 80 inches; dark gray (5Y 4/1) silty clay loam, black (5Y 2.5/1) moist; massive; very hard, firm, sticky and plastic; few very fine roots throughout; few fine and many very fine tubular pores; common fine carbonate concretions; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 24 to 60 inches
Depth to carbonates: 0 to 3 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: 30 to 60 inches

A horizon:
Hue—10YR, 2.5Y, 5Y, or N
Value—3 to 5 (2 or 3 moist)
Chroma—0 or 1
Texture—dominantly silty clay loam; silty clay, clay loam, or loam in some pedons

Byzg horizon:
Hue—10YR, 2.5Y, 5Y, or N
Value—3 to 6 (2 to 4 moist)
Chroma—0 or 1
Texture—dominantly silty clay; silty clay loam or clay in some pedons

Bg and Bkg horizons:
Hue—2.5Y, 5Y, or N
Value—3 to 6 (2 to 4 moist)
Chroma—0 or 1
Texture—dominantly silty clay; silty clay loam or clay in some pedons

Cg horizon:
Hue—2.5Y, 5Y, or N
Value—4 to 7 (2 to 6 moist)
Chroma—0 or 1
Texture—silty clay loam, silty clay, or clay loam
Other features—sand and gravel below a depth of 60 inches in some pedons

Betts Series

Depth to bedrock: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Landform: Till plains
Parent material: Glacial till
Slope range: 9 to 40 percent

Typical Pedon

Betts loam, in an area of Ethan-Betts loams, 15 to 40 percent slopes, 2,200 feet south and 170 feet east of the northwest corner of sec. 19, T. 95 N., R. 53 W.

A—0 to 4 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine roots throughout; few fine and common very fine tubular pores; about 5 percent pebbles; strong effervescence; slightly alkaline; clear smooth boundary.

Bk1—4 to 14 inches; light yellowish brown (2.5Y 6/4) clay loam, olive brown (2.5Y 4/4) moist; few fine distinct olive yellow (2.5Y 6/6) and few fine prominent yellowish brown (10YR 5/6) redox concentrations; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots throughout; few fine and common very fine tubular pores; common fine soft masses of carbonate; about 5 percent pebbles; violent effervescence; slightly alkaline; clear smooth boundary.

Bk2—14 to 23 inches; light yellowish brown (2.5Y 6/4) clay loam, light olive brown (2.5Y 5/4) moist; few fine distinct olive yellow (2.5Y 6/6) and few fine prominent yellowish brown (10YR 5/6) redox concentrations; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine roots between peds; few fine and common very fine vesicular and tubular pores; common fine and medium soft masses of carbonate; about 5 percent pebbles; violent effervescence; slightly alkaline; gradual wavy boundary.

Bk3—23 to 41 inches; pale yellow (2.5Y 7/4) clay loam, light olive brown (2.5Y 5/4) moist; few fine prominent yellowish brown (10YR 5/6) and strong brown (7.5YR 5/8) and common fine distinct olive yellow (2.5Y 6/6) redox concentrations; weak coarse subangular blocky structure parting to moderate medium subangular blocky; hard, firm, slightly sticky and slightly plastic; few fine roots between peds; few fine and common very fine vesicular and tubular pores; many fine and medium soft masses of carbonate; about 5 percent pebbles; violent effervescence; slightly alkaline; gradual wavy boundary.

C1—41 to 53 inches; light yellowish brown (2.5Y 6/4) clay loam, light olive brown (2.5Y 5/4) moist; few fine prominent strong brown (7.5YR 5/8) and light gray (2.5Y 7/1), few fine and medium prominent yellowish red (5YR 5/8), and common fine distinct olive yellow (2.5Y 6/6) redox concentrations; weak coarse subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few fine and common very fine vesicular and tubular pores; few fine and medium soft masses of carbonate; about 5 percent pebbles; strong effervescence; slightly alkaline; gradual wavy boundary.

C2—53 to 80 inches; light yellowish brown (2.5Y 6/4) clay loam, light olive brown (2.5Y 5/4) moist; few fine prominent strong brown (7.5YR 5/8) and light gray (2.5Y 7/1), few fine and medium prominent yellowish red (5YR 5/8), and common fine distinct olive yellow (2.5Y 6/6) redox concentrations; massive; hard, firm, slightly sticky and slightly plastic; few fine and common very fine vesicular and tubular pores; about 5 percent pebbles; strong effervescence; slightly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 2 to 5 inches
Depth to carbonates: 0 to 3 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: More than 60 inches

A horizon:
Hue—10YR or 2.5Y
Value—3 to 6 (2 to 5 moist)
Chroma—1 to 3
Texture—loam or clay loam

Bk horizon:
Hue—10YR or 2.5Y
Value—5 or 6 (4 or 5 moist)
Chroma—2 or 3
Texture—clay loam or loam

C horizon:
Hue—2.5Y or 5Y
Value—5 to 7 (4 to 6 moist)
Chroma—2 to 4
Texture—clay loam or loam

Blake Series

Depth to bedrock: Very deep
Drainage class: Moderately well drained
Permeability: Moderate
Landform: Flood plains
Parent material: Alluvium
Slope range: 0 to 2 percent

Typical Pedon

Blake silty clay loam, 0 to 2 percent slopes, 2,150 feet west and 240 feet north of the southeast corner of sec. 21, T. 92 N., R. 51 W.

Ap—0 to 9 inches; gray (10YR 5/1) silty clay loam, very dark gray (10YR 3/1) moist; weak medium subangular blocky structure parting to weak fine subangular blocky; hard, friable, slightly sticky and slightly plastic; common fine and very fine roots throughout; few fine and common very fine tubular pores; slight effervescence in the lower part; slightly alkaline; abrupt smooth boundary.

C1—9 to 25 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; common fine prominent yellowish brown (10YR 5/6) redox concentrations; massive; hard, friable, slightly sticky and slightly plastic; few very fine roots throughout; few fine and common very fine tubular pores; strong effervescence; moderately alkaline; abrupt smooth boundary.

C2—25 to 43 inches; light brownish gray (2.5Y 6/2) silt loam with thin strata of very fine sandy loam and silty clay loam; grayish brown (2.5Y 5/2) moist; many fine and few medium prominent yellowish brown (10YR 5/6) redox concentrations; massive; slightly hard, very friable; few very fine roots throughout; few fine and common very fine tubular pores; strong effervescence; moderately alkaline; clear smooth boundary.

C3—43 to 80 inches; light brownish gray (2.5Y 6/2) very fine sandy loam with thin strata of silt loam and silty clay loam; grayish brown (2.5Y 5/2) moist; common fine prominent yellowish brown (10YR 5/6) redox concentrations; massive; soft, very friable; few fine and common very fine tubular pores; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 6 to 10 inches
Depth to carbonates: 0 to 8 inches
Depth to contrasting parent material: 40 to more than 60 inches over sandy alluvium
Depth to gypsum and other visible salts: More than 60 inches

A horizon:
Hue—10YR or 2.5Y
Value—4 or 5 (3 or 4 moist)
Chroma—1 or 2
Texture—silty clay loam or silt loam

C1 horizon:
Hue—10YR or 2.5Y

Value—4 to 6 (3 to 5 moist)
Chroma—1 to 4
Texture—silty clay loam
Other features—strata of silty clay and silt loam in some pedons

C2 and C3 horizons:
Hue—10YR or 2.5Y
Value—4 to 6 (3 to 5 moist)
Chroma—1 to 4
Texture—silt loam or very fine sandy loam with thin strata of silty clay loam

Blencoe Series

Depth to bedrock: Very deep
Drainage class: Somewhat poorly drained
Permeability: Slow
Landform: Flood plains
Parent material: Alluvium
Slope range: 0 to 2 percent
Taxadjunct features: The Blencoe soils in this survey area have a clayey substratum.

Typical Pedon

Blencoe silty clay, 0 to 2 percent slopes, clayey substratum, 2,060 feet south and 300 feet east of the northwest corner of sec. 20, T. 93 N., R. 52 W.

Ap—0 to 8 inches; very dark gray (10YR 3/1) silty clay, black (10YR 2/1) moist; weak medium subangular blocky structure; very hard, firm, sticky and plastic; few fine and very fine roots throughout; common very fine tubular pores; slightly acid; abrupt smooth boundary.

A—8 to 15 inches; very dark gray (10YR 3/1) silty clay, black (10YR 2/1) moist; moderate medium subangular blocky structure; very hard, firm, sticky and plastic; few fine and very fine roots throughout; common very fine tubular pores; slightly acid; clear smooth boundary.

Bw1—15 to 23 inches; dark gray (2.5Y 4/1) silty clay, black (2.5Y 2.5/1) moist; few fine prominent dark yellowish brown (10YR 4/4) redox concentrations; moderate medium prismatic structure parting to moderate fine and medium subangular blocky; very hard, firm, sticky and plastic; few fine and very fine roots throughout; common very fine tubular pores; few fine iron-manganese concretions; neutral; clear wavy boundary.

Bw2—23 to 33 inches; gray (2.5Y 5/1) silty clay, dark gray (2.5Y 4/1) moist; common fine prominent dark yellowish brown (10YR 4/4) redox concentrations; weak medium prismatic structure parting to moderate fine and medium subangular blocky; very hard, firm, sticky and plastic; few fine and very fine roots throughout; common very fine tubular pores; few fine iron-manganese concretions; neutral; abrupt wavy boundary.

2C—33 to 42 inches; light yellowish brown (2.5Y 6/3) silt loam, light olive brown (2.5Y 5/3) moist; common fine prominent dark yellowish brown (10YR 4/4) redox concentrations; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine roots throughout; common very fine tubular pores; few fine iron-manganese concretions; strong effervescence; slightly alkaline; abrupt wavy boundary.

3Cg—42 to 66 inches; gray (5Y 6/1) silty clay, dark gray (5Y 4/1) moist; many fine and common medium prominent dark yellowish brown (10YR 4/4) redox concentrations; massive; very hard, very firm, sticky and plastic; few very fine roots throughout; common very fine tubular pores; common prominent intersecting slickensides; few fine and medium carbonate concretions; few fine threads of salt; slight effervescence; slightly alkaline; abrupt wavy boundary.

3Ab—66 to 80 inches; gray (5Y 5/1) silty clay, very dark gray (5Y 3/1) moist; common fine prominent dark yellowish brown (10YR 4/4) redox concentrations; massive; very hard, very firm, sticky and plastic; few very fine roots throughout; common very fine tubular pores; few prominent intersecting slickensides; few fine carbonate concretions; few fine threads of salt; slight effervescence; slightly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 14 to 24 inches
Depth to carbonates: 25 to 40 inches
Depth to contrasting parent material: 22 to 40 inches over loamy alluvium
Depth to gypsum and other visible salts: 40 to more than 60 inches
Other features: Some pedons do not have a thick buried A horizon.

A horizon:
Hue—10YR
Value—3 to 5 (2 or 3 moist)
Chroma—1 or 2
Texture—silty clay or silty clay loam

Bw horizon:
Hue—10YR or 2.5Y
Value—3 to 5 (2 to 4 moist)
Chroma—1 or 2
Texture—silty clay

2C horizon:
Hue—10YR or 2.5Y
Value—5 to 7 (3 to 6 moist)
Chroma—2 or 3
Texture—silt loam or very fine sandy loam

3Cg horizon:
Hue—2.5Y or 5Y
Value—5 to 7 (3 to 6 moist)
Chroma—1 or 2
Texture—silty clay or silty clay loam

3Ab horizon:
Hue—2.5Y or 5Y
Value—4 or 5 (3 or 4 moist)
Chroma—1 or 2
Texture—silty clay or silty clay loam

Blyburg Series

Depth to bedrock: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Flood plains
Parent material: Alluvium
Slope range: 0 to 2 percent

Typical Pedon

Blyburg silt loam, 0 to 2 percent slopes, 2,300 feet north and 300 feet east of the southwest corner of sec. 30, T. 93 N., R. 53 W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium subangular blocky structure; soft, very friable; many fine roots throughout; common very fine tubular pores; slightly alkaline; abrupt smooth boundary.

A1—8 to 14 inches; very dark grayish brown (10YR 3/2) silt loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure; soft, very friable; common fine roots throughout; few fine and common very fine tubular pores; slight effervescence; slightly alkaline; clear smooth boundary.

A2—14 to 18 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; soft, very friable; few fine roots throughout; few fine and common very fine tubular pores; slight effervescence; moderately alkaline; clear wavy boundary.

C1—18 to 44 inches; light yellowish brown (2.5Y 6/3) silt loam with thin strata of very fine sandy loam and silty clay loam; olive brown (2.5Y 4/3) moist; few fine and medium prominent yellowish brown (10YR 5/6) redox concentrations; weak medium subangular blocky structure; soft, very friable; few fine roots throughout; common lenses of very fine sandy loam and light silty clay loam $^1/_8$ to $^3/_8$ inch thick; strong effervescence; moderately alkaline; abrupt wavy boundary.

C2—44 to 77 inches; pale yellow (2.5Y 7/3) very fine sandy loam with thin strata of silt loam and loamy very fine sand; light olive brown (2.5Y 5/3) moist; few fine and medium distinct dark yellowish brown (10YR 4/4) redox concentrations; massive; soft, very friable; few fine roots throughout; few fine and common very fine tubular pores; common lenses of silt loam and loamy very fine sand $^1/_8$ to $^3/_8$ inch thick; strong effervescence; moderately alkaline; abrupt smooth boundary.

C3—77 to 80 inches; olive (5Y 5/3) silty clay with thin strata of silty clay loam and silt loam or very fine sandy loam; olive (5Y 4/3) moist; many fine and medium prominent reddish brown (5YR 4/4) redox concentrations; massive; hard, firm, sticky and plastic; few fine and common very fine tubular pores; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 10 to 20 inches
Depth to carbonates: 8 to 20 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: More than 60 inches
Other features: Some pedons do not have a C3 horizon of silty clay. This horizon is not included in the engineering index properties table.

A horizon:
Hue—10YR
Value—3 or 4 (2 or 3 moist)
Chroma—1 to 3
Texture—silt loam or silty clay loam
Other features—fine sandy loam or sandy loam overwash in some pedons

C horizon:
Hue—10YR, 2.5Y, or 5Y
Value—5 to 7 (4 or 5 moist)
Chroma—2 or 3
Texture—silt loam or very fine sandy loam with thin strata of silty clay loam and loamy very fine sand; silty clay below a depth of 60 inches with thin strata of silty clay loam, silt loam, and very fine sandy loam

Bon Series

Depth to bedrock: Very deep
Drainage class: Well drained and moderately well drained
Permeability: Moderate
Landform: Flood plains
Parent material: Alluvium
Slope range: 0 to 2 percent

Typical Pedon

Bon loam, in an area of Ethan-Bon, channeled, loams, 0 to 40 percent slopes, 340 feet north and 130 feet east of the southwest corner of sec. 27, T. 94 N., R. 53 W.

A1—0 to 8 inches; dark gray (10YR 4/1) loam, very dark gray (10YR 3/1) moist; moderate fine and medium subangular blocky structure parting to moderate fine granular; slightly hard, very friable, slightly sticky and slightly plastic; common fine and very fine roots throughout; few fine and common very fine tubular pores; strong effervescence; neutral; clear smooth boundary.

A2—8 to 15 inches; dark gray (10YR 4/1) loam, black (10YR 2/1) moist; moderate fine and medium subangular blocky structure parting to moderate fine granular; slightly hard, very friable, slightly sticky and slightly plastic; few fine and common very fine roots throughout; few fine and common very fine tubular pores; strong effervescence; slightly alkaline; clear smooth boundary.

Bw1—15 to 33 inches; very dark gray (10YR 3/1) loam, black (10YR 2/1) moist; moderate fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few fine and very fine roots throughout; few fine and common very fine tubular pores; strong effervescence; slightly alkaline; gradual wavy boundary.

Bw2—33 to 43 inches; dark gray (10YR 4/1) loam, black (10YR 2/1) moist; moderate fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few fine and very fine roots throughout; few fine and common very fine tubular pores; strong effervescence; slightly alkaline; clear wavy boundary.

Bk—43 to 56 inches; dark gray (10YR 4/1) loam, very dark gray (10YR 3/1) moist; moderate fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few fine and very fine roots throughout; few fine and common very fine tubular pores; few fine carbonate concretions; violent effervescence; moderately alkaline; clear smooth boundary.

C1—56 to 60 inches; grayish brown (2.5Y 5/2) loam, very dark gray (10YR 3/1) moist; few fine prominent dark yellowish brown (10YR 4/6) redox concentrations; weak fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few lenses of sandy loam $^{1}/_{8}$ to $^{1}/_{2}$ inch thick; common fine and very fine tubular pores; strong effervescence; moderately alkaline; clear smooth boundary.

C2—60 to 80 inches; grayish brown (2.5Y 5/2) clay loam, very dark gray (10YR 3/1) moist; few fine prominent dark yellowish brown (10YR 4/6) redox concentrations; massive; slightly hard, friable, slightly sticky and slightly plastic; few lenses of fine sandy loam $^{1}/_{8}$ to $^{3}/_{8}$ inch thick; few medium, common fine, and many very fine tubular pores; strong effervescence; slightly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 20 to more than 60 inches
Depth to carbonates: 0 to 20 inches
Depth to contrasting parent material: 40 to more than 60 inches over outwash sand and gravel or clayey alluvium
Depth to gypsum and other visible salts: More than 60 inches

A horizon:
Hue—10YR or 2.5Y
Value—3 to 5 (2 or 3 moist)
Chroma—1 or 2
Texture—dominantly loam; silt loam or very fine sandy loam in some pedons

Bw horizon:
Hue—10YR or 2.5Y
Value—3 to 5 (2 or 3 moist)
Chroma—1 to 3
Texture—loam, silt loam, or very fine sandy loam

Bk horizon:
Hue—10YR or 2.5Y
Value—3 to 7 (2 to 5 moist)
Chroma—1 to 3
Texture—dominantly loam, silt loam, or fine sandy loam; clay loam or silty clay loam in some pedons

C horizon:
Hue—10YR, 2.5Y, or 5Y
Value—3 to 7 (2 to 5 moist)
Chroma—1 to 3

Texture—dominantly loam and clay loam with thin strata of sandy loam and fine sandy loam; loamy fine sand, silt loam, or silty clay loam in some pedons

Chancellor Series

Depth to bedrock: Very deep
Drainage class: Somewhat poorly drained
Permeability: Slow
Landform: Till plains
Parent material: Local alluvium
Slope range: 0 to 2 percent

Typical Pedon

Chancellor silty clay loam, in an area of Egan-Chancellor-Davison complex, 0 to 3 percent slopes, 350 feet south and 300 feet west of the northeast corner of sec. 5, T. 95 N., R. 51 W.

Ap—0 to 10 inches; very dark gray (10YR 3/1) silty clay loam, black (10YR 2/1) moist; weak medium subangular blocky structure parting to weak fine and medium granular; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots throughout; common very fine vesicular and tubular pores; neutral; abrupt smooth boundary.

Bt—10 to 30 inches; very dark gray (10YR 3/1) silty clay, black (10YR 2/1) moist; few fine prominent yellowish brown (10YR 5/6) redox concentrations; moderate medium prismatic structure parting to moderate medium blocky; hard, firm, sticky and plastic; few fine and very fine roots between peds; few fine and common very fine tubular pores; common discontinuous distinct clay films on faces of peds and in pores; slightly alkaline; clear smooth boundary.

Btg—30 to 36 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; common fine prominent light olive brown (2.5Y 5/6) and few fine prominent strong brown (7.5YR 5/6) redox concentrations; strong medium prismatic structure; hard, firm, sticky and plastic; few fine roots between peds; few fine and common very fine tubular pores; common continuous prominent clay films on faces of peds and in pores; slightly alkaline; clear wavy boundary.

Btgy—36 to 41 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; common fine distinct light olive brown (2.5Y 5/6) and few fine prominent strong brown (7.5YR 5/6) redox concentrations; strong medium prismatic structure; hard, firm, sticky and plastic; few fine and common very fine tubular pores; common continuous prominent clay films on faces of peds and in pores; common fine and medium nests of gypsum; slightly alkaline; abrupt wavy boundary.

Bkg1—41 to 47 inches; light yellowish brown (2.5Y 6/3) silty clay loam, light olive brown (2.5Y 5/3) moist; many fine prominent light olive brown (2.5Y 5/6), common fine prominent strong brown (7.5YR 5/6), and few fine prominent strong brown (7.5YR 5/8) redox concentrations; weak medium prismatic structure parting to moderate medium blocky; hard, firm, slightly sticky and slightly plastic; few fine and many very fine tubular pores; common patchy distinct clay films on faces of peds and in pores; few fine soft masses of carbonate; strong effervescence; slightly alkaline; gradual wavy boundary.

Bkg2—47 to 54 inches; light olive gray (5Y 6/2) silty clay loam, olive gray (5Y 5/2) moist; many fine prominent yellowish brown (10YR 5/6) and few fine prominent strong brown (7.5YR 5/6) redox concentrations; weak medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few fine and common very fine tubular pores; common fine soft masses of carbonate and few medium carbonate concretions; violent effervescence; slightly alkaline; clear wavy boundary.

2Bkg3—54 to 69 inches; light olive gray (5Y 6/2) clay loam, olive gray (5Y 5/2) moist; many fine prominent yellowish brown (10YR 5/6) and few fine prominent strong brown (7.5YR 5/6) redox concentrations; weak medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; common fine and many very fine tubular pores; many fine and common medium soft masses of carbonate and common medium carbonate concretions; about 3 percent pebbles; violent effervescence; slightly alkaline; gradual wavy boundary.

2Cg—69 to 80 inches; light olive gray (5Y 6/2) clay loam, olive gray (5Y 5/2) moist; many fine prominent yellowish brown (10YR 5/6) and common fine prominent strong brown (7.5YR 5/6) redox concentrations; common fine prominent light gray (N 7/0) redox depletions; massive; very hard, firm, slightly sticky and slightly plastic; common fine and many very fine tubular pores; about 3 percent pebbles; strong effervescence; slightly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 24 to 40 inches

Depth to carbonates: 28 to 50 inches
Depth to contrasting parent material: 40 to more than 60 inches over loamy glacial till
Depth to gypsum and other visible salts: 24 to 60 inches
Other features: Some pedons do not have underlying layers of loamy glacial till and have a C horizon of silty clay loam.

A horizon:
Hue—10YR, 2.5Y, or N
Value—3 or 4 (2 or 3 moist)
Chroma—0 or 1
Texture—silty clay loam or silty clay

Bt and Btg horizons:
Hue—10YR, 2.5Y, or 5Y
Value—3 to 6 (2 to 4 moist)
Chroma—1 or 2
Texture—silty clay or silty clay loam

Bkg horizon:
Hue—2.5Y or 5Y
Value—4 to 7 (3 to 6 moist)
Chroma—1 to 4
Texture—silty clay loam

2Bkg and 2Cg horizons:
Hue—2.5Y or 5Y
Value—5 to 7 (4 to 6 moist)
Chroma—1 to 4
Texture—clay loam or loam

Chaska Series

Depth to bedrock: Very deep
Drainage class: Somewhat poorly drained
Permeability: Moderate
Landform: Flood plains
Parent material: Alluvium
Slope range: 0 to 2 percent

Typical Pedon

Chaska silt loam, channeled, 1,310 feet east and 280 feet north of the southwest corner of sec. 3, T. 95 N., R. 52 W.

A—0 to 7 inches; dark gray (10YR 4/1) and very dark grayish brown (2.5Y 3/2) silt loam, very dark gray (10YR 3/1) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few fine and very fine roots throughout; common very fine tubular pores; strong effervescence; moderately alkaline; abrupt smooth boundary.

C1—7 to 24 inches; dark gray (10YR 4/1) and dark grayish brown (2.5Y 4/2) silt loam with strata of very dark grayish brown (10YR 3/2) loamy fine sand less than 1/2 inch thick; very dark gray (10YR 3/1) moist; common fine and medium distinct dark yellowish brown (10YR 4/4) redox concentrations; slightly hard, very friable, slightly sticky and slightly plastic; few fine and very fine roots throughout; few fine and very fine tubular pores; strong effervescence; moderately alkaline; clear smooth boundary.

C2—24 to 43 inches; dark gray (10YR 4/1) and brown (10YR 5/3) silt loam with strata of very dark grayish brown (10YR 3/2) loamy fine sand and very fine sandy loam less than 1/2 inch thick and strata of silty clay loam as much as 6 inches thick; black (10YR 2/1) moist; few fine distinct dark yellowish brown (10YR 4/4) redox concentrations; hard, very friable, slightly sticky and slightly plastic; few very fine roots throughout; few fine and very fine tubular pores; strong effervescence; moderately alkaline; clear smooth boundary.

C3—43 to 80 inches; dark gray (10YR 4/1) and brown (10YR 5/3) loam with strata of very dark grayish brown (10YR 3/2) very fine sandy loam less than 1/4 inch thick; black (10YR 2/1) moist; few fine and medium prominent dark yellowish brown (10YR 3/4) and dark reddish brown (5YR 3/3) redox concentrations; hard, very friable, slightly sticky and slightly plastic; few fine and very fine roots throughout; few fine and very fine tubular pores; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 0 to 8 inches
Depth to carbonates: 0 to 10 inches
Depth to contrasting parent material: 40 to more than 60 inches over sandy alluvium
Depth to gypsum and other visible salts: More than 60 inches
Other features: Some pedons have a 2C horizon of fine sand or loamy fine sand below a depth of 60 inches.

A horizon:
Hue—10YR or 2.5Y
Value—3 or 4 (2 or 3 moist)
Chroma—1 or 2
Texture—dominantly silt loam; loam, clay loam, or silty clay loam in some pedons

C horizon:
Hue—10YR, 2.5Y, or 5Y
Value—3 to 6 (2 to 5 moist)
Chroma—1 to 3
Texture—dominantly silt loam, loam, or very fine

sandy loam with strata of loamy fine sand and fine sand; strata of fine sandy loam, sandy clay loam, silty clay loam, or clay loam in some pedons

Clamo Series

Depth to bedrock: Very deep
Drainage class: Poorly drained
Permeability: Slow
Landform: Flood plains
Parent material: Alluvium
Slope range: 0 to 1 percent

Typical Pedon

Clamo silty clay, 0 to 1 percent slopes, 2,500 feet west and 160 feet south of the northeast corner of sec. 11, T. 95 N., R. 52 W.

Ap—0 to 8 inches; very dark gray (2.5Y 3/1) silty clay, black (2.5Y 2.5/1) moist; weak medium subangular blocky structure parting to weak fine granular; hard, friable, sticky and plastic; few fine and common very fine roots throughout; few fine tubular pores; neutral; abrupt smooth boundary.

A—8 to 13 inches; very dark gray (2.5Y 3/1) silty clay, black (2.5Y 2.5/1) moist; few fine prominent dark yellowish brown (10YR 4/4) redox concentrations; weak medium subangular blocky structure parting to weak fine granular; hard, firm, sticky and plastic; few very fine roots throughout; few fine tubular pores; neutral; clear smooth boundary.

Bg—13 to 23 inches; very dark gray (5Y 3/1) silty clay, black (5Y 2.5/1) moist; common fine prominent dark yellowish brown (10YR 4/4) redox concentrations; weak coarse prismatic structure parting to moderate medium subangular blocky; hard, firm, sticky and plastic; few very fine roots throughout; common fine tubular pores; slightly alkaline; abrupt smooth boundary.

Bkg1—23 to 34 inches; very dark gray (5Y 3/1) silty clay, black (5Y 2.5/1) moist; many fine prominent dark yellowish brown (10YR 4/4) redox concentrations; weak medium prismatic structure parting to weak medium subangular blocky; hard, firm, sticky and plastic; few very fine roots throughout; common fine tubular pores; common fine soft masses of carbonate and common fine carbonate concretions; strong effervescence; moderately alkaline; clear wavy boundary.

Bkg2—34 to 45 inches; dark gray (5Y 4/1) and olive gray (5Y 4/2) silty clay, very dark gray (5Y 3/1) and dark olive gray (5Y 3/2) moist; many fine prominent olive brown (2.5Y 4/4) redox concentrations; weak medium prismatic structure parting to weak medium subangular blocky; hard, firm, sticky and plastic; few very fine roots throughout; common fine and many very fine tubular pores; few fine iron-manganese concretions; common fine soft masses of carbonate and common fine carbonate concretions; strong effervescence; moderately alkaline; gradual wavy boundary.

Bkg3—45 to 54 inches; olive gray (5Y 5/2) silty clay, olive gray (5Y 4/2) moist; many fine prominent olive brown (2.5Y 4/4) redox concentrations; weak medium prismatic structure parting to weak medium subangular blocky; hard, firm, sticky and plastic; few fine and many very fine tubular pores; few fine iron-manganese concretions; few fine soft masses of carbonate and few medium carbonate concretions; strong effervescence; moderately alkaline; gradual wavy boundary.

Cg1—54 to 62 inches; light brownish gray (2.5Y 6/2) silty clay, grayish brown (2.5Y 5/2) moist; many fine distinct light olive brown (2.5Y 5/4) redox concentrations and few fine distinct gray (2.5Y 5/1) redox depletions; massive; very hard, firm, sticky and plastic; few fine and common very fine tubular pores; common fine iron-manganese concretions; common fine and medium carbonate concretions; violent effervescence; moderately alkaline; clear smooth boundary.

Cg2—62 to 80 inches; light gray (2.5Y 7/2) clay loam, grayish brown (2.5Y 5/2) moist; few fine distinct light olive brown (2.5Y 5/4) redox concentrations and common fine distinct gray (2.5Y 5/1) redox depletions; massive; very hard, firm, slightly sticky and slightly plastic; common very fine tubular pores; common fine and medium carbonate concretions; violent effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 24 to 48 inches
Depth to carbonates: 14 to 30 inches
Depth to contrasting parent material: 40 to more than 60 inches over loamy alluvium
Depth to gypsum and other visible salts: 25 to more than 60 inches
Other features: Some pedons have sandy underlying layers below a depth of 60 inches.

A horizon:
Hue—10YR, 5Y, or N
Value—3 or 4 (2 or 3 moist)
Chroma—0 or 1
Texture—dominantly silty clay; clay, silty clay loam, silt loam, or loam in some pedons

Bg horizon:
Hue—2.5Y, 5Y, or N
Value—3 to 5 (2 or 3 moist)
Chroma—0 to 2
Texture—silty clay loam, silty clay, or clay

Bkg horizon:
Hue—2.5Y, 5Y, or N
Value—4 to 7 (2 to 5 moist)
Chroma—0 to 2
Texture—silty clay loam, silty clay, or clay

Cg horizon:
Hue—2.5Y, 5Y, or N
Value—4 to 7 (2 to 5 moist)
Chroma—0 to 2
Texture—silty clay loam, silty clay, clay, or clay loam

Clarno Series

Depth to bedrock: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Landform: Till plains
Parent material: Glacial till
Slope range: 0 to 15 percent

Typical Pedon

Clarno loam, in an area of Ethan-Clarno loams, 6 to 9 percent slopes, 2,280 feet north and 115 feet east of the southwest corner of sec. 32, T. 95 N., R. 53 W.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; moderate fine and medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine and very fine roots throughout; common very fine vesicular and tubular pores; about 3 percent pebbles; neutral; abrupt smooth boundary.

Bw—7 to 16 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine roots throughout; few fine and common very fine vesicular and tubular pores; about 5 percent pebbles; neutral; abrupt smooth boundary.

Bk1—16 to 29 inches; light yellowish brown (2.5Y 6/4) clay loam, olive brown (2.5Y 4/4) moist; few fine prominent yellowish brown (10YR 5/6) redox concentrations; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots between peds; few fine and common very fine vesicular and tubular pores; common fine and medium soft masses of carbonate; about 5 percent pebbles; violent effervescence; moderately alkaline; clear wavy boundary.

Bk2—29 to 44 inches; light yellowish brown (2.5Y 6/4) clay loam, olive brown (2.5Y 4/4) moist; common fine prominent yellowish brown (10YR 5/6) and few fine prominent yellowish red (5YR 5/8) redox concentrations; common fine and medium prominent gray (2.5Y 6/1) redox depletions; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine roots between peds; few fine and common very fine vesicular and tubular pores; many fine and common medium soft masses of carbonate; violent effervescence; about 5 percent pebbles; moderately alkaline; gradual wavy boundary.

Bk3—44 to 53 inches; pale yellow (2.5Y 7/4) clay loam, light olive brown (2.5Y 5/4) moist; common fine and medium prominent yellowish red (5YR 5/8) and common fine prominent yellowish brown (10YR 5/6) redox concentrations; few fine prominent gray (2.5Y 6/1) redox depletions; weak coarse subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few fine and common very fine vesicular and tubular pores; common fine soft masses of carbonate; about 5 percent pebbles; violent effervescence; moderately alkaline; gradual wavy boundary.

C—53 to 80 inches; pale yellow (2.5Y 7/4) clay loam, light olive brown (2.5Y 5/4) moist; common fine and medium prominent gray (2.5Y 6/1) redox depletions; common fine prominent yellowish brown (10YR 5/6) and few fine prominent yellowish red (5YR 5/8) redox concentrations; massive; hard, firm, slightly sticky and slightly plastic; few fine and common very fine vesicular and tubular pores; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 8 to 20 inches
Depth to carbonates: 12 to 26 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: 40 to more than 60 inches

A horizon:
Hue—10YR
Value—3 or 4 (2 or 3 moist)
Chroma—1 or 2
Texture—loam or silt loam

Bw horizon:

Hue—10YR or 2.5Y
Value—4 or 5 (2 to 4 moist)
Chroma—2 or 3
Texture—loam or clay loam

Bk horizon:

Hue—10YR, 2.5Y, or 5Y
Value—5 to 7 (4 to 6 moist)
Chroma—2 to 4
Texture—loam or clay loam

C horizon:

Hue—10YR, 2.5Y, or 5Y
Value—5 to 8 (4 to 6 moist)
Chroma—2 to 4
Texture—loam or clay loam

Dalesburg Series

Depth to bedrock: Very deep
Drainage class: Moderately well drained
Permeability: Rapid
Landform: Flood plains
Parent material: Alluvium
Slope range: 0 to 4 percent

Typical Pedon

Dalesburg loam, 0 to 2 percent slopes, 2,260 feet east and 190 feet south of the northwest corner of sec. 23, T. 95 N., R. 52 W.

Ap—0 to 7 inches; dark gray (10YR 4/1) loam, black (10YR 2/1) moist; weak fine and medium subangular blocky structure parting to weak fine and medium granular; slightly hard, friable, slightly sticky and slightly plastic; few fine and common very fine roots throughout; few fine and common very fine tubular pores; slightly acid; abrupt smooth boundary.

A—7 to 14 inches; dark gray (10YR 4/1) loam, black (10YR 2/1) moist; weak coarse subangular blocky structure parting to weak medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; few fine and very fine roots throughout; few fine and common very fine tubular pores; slightly acid; clear smooth boundary.

Bw1—14 to 24 inches; very dark grayish brown (10YR 3/2) sandy loam, very dark brown (10YR 2/2) moist; weak coarse subangular blocky structure parting to weak medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; few fine and very fine roots throughout; few fine and common very fine tubular pores; neutral; clear smooth boundary.

Bw2—24 to 34 inches; dark grayish brown (10YR 4/2) sandy loam, very dark grayish brown (10YR 3/2) moist; few fine distinct dark yellowish brown (10YR 4/4) redox concentrations; weak coarse subangular blocky structure parting to weak medium subangular blocky; soft, very friable; few very fine roots throughout; common very fine vesicular and tubular pores; neutral; abrupt wavy boundary.

C1—34 to 48 inches; brown (10YR 5/3) loamy sand, dark brown (10YR 3/3) moist; common fine prominent strong brown (7.5YR 4/6) and many fine distinct brown (7.5YR 4/4) redox concentrations; weak coarse subangular blocky structure parting to single grain; soft, very friable and loose; common very fine interstitial pores; strong effervescence; slightly alkaline; gradual wavy boundary.

C2—48 to 62 inches; pale brown (10YR 6/3) loamy sand, brown (10YR 4/3) moist; common fine prominent strong brown (7.5YR 4/6) and many fine distinct brown (7.5YR 4/4) redox concentrations; single grain; loose; many very fine interstitial pores; strong effervescence; moderately alkaline; abrupt smooth boundary.

C3—62 to 80 inches; brown (7.5YR 5/3) gravelly sand, dark brown (7.5YR 3/3) moist; common fine distinct strong brown (7.5YR 4/6) and many fine distinct brown (7.5YR 4/4) redox concentrations; single grain; loose; many very fine interstitial pores; few fine iron-manganese concretions; about 20 percent gravel; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 20 to 50 inches
Depth to carbonates: 20 to 40 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: More than 60 inches

A horizon:

Hue—10YR
Value—3 or 4 (2 or 3 moist)
Chroma—1 or 2
Texture—dominantly loam; sandy loam, sandy clay loam, or silt loam in some pedons

Bw horizon:

Hue—10YR or 2.5Y
Value—3 to 5 (2 to 4 moist)
Chroma—2 to 4
Texture—loam, sandy loam, fine sandy loam, sandy clay loam, loamy sand, or loamy fine sand

C horizon:
Hue—7.5YR, 10YR, or 2.5Y
Value—4 to 6 (3 to 5 moist)
Chroma—2 to 6
Texture—loamy sand, loamy fine sand, fine sand, sand, gravelly loamy sand, gravelly sand, very gravelly sand, or very gravelly loamy sand

Davis Series

Depth to bedrock: Very deep
Drainage class: Well drained and moderately well drained
Permeability: Moderate
Landform: Alluvial terraces or colluvial fans
Parent material: Alluvium or colluvium
Slope range: 0 to 6 percent

Typical Pedon

Davis loam, 2 to 6 percent slopes, 1,047 feet west and 100 feet south of the northeast corner of sec. 22, T. 94 N., R. 52 W.

Ap—0 to 8 inches; very dark gray (10YR 3/1) loam, black (10YR 2/1) moist; moderate fine and medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine roots throughout; common very fine vesicular and tubular pores; neutral; abrupt smooth boundary.

A—8 to 15 inches; very dark gray (10YR 3/1) loam, black (10YR 2/1) moist; weak medium subangular blocky structure parting to weak fine and medium granular; slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine roots throughout; common very fine vesicular and tubular pores; neutral; clear smooth boundary.

Bw1—15 to 33 inches; very dark grayish brown (10YR 3/2) loam, black (10YR 2/1) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots between peds; common very fine vesicular and tubular pores; neutral; clear smooth boundary.

Bw2—33 to 41 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots between peds; few fine and common very fine vesicular and tubular pores; slightly alkaline; abrupt smooth boundary.

Bk—41 to 64 inches; light olive brown (2.5Y 5/3) clay loam, olive brown (2.5Y 4/3) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine roots between peds; few fine and common very fine vesicular and tubular pores; many fine soft masses of carbonate; about 2 percent pebbles; violent effervescence; moderately alkaline; clear smooth boundary.

C—64 to 80 inches; light yellowish brown (2.5Y 6/3) clay loam, light olive brown (2.5Y 5/3) moist; massive; hard, friable, slightly sticky and slightly plastic; common lenses of sandy clay loam 1 to 2 inches thick; few fine and common very fine vesicular and tubular pores; about 3 percent pebbles; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 20 to 60 inches
Depth to carbonates: 20 to 60 inches
Depth to contrasting parent material: 40 to more than 60 inches over clayey alluvium
Depth to gypsum and other visible salts: More than 60 inches
Other features: Some pedons have silty clay below a depth of 60 inches.

A horizon:
Hue—10YR
Value—3 or 4 (2 or 3 moist)
Chroma—1 or 2
Texture—loam or silt loam

Bw horizon:
Hue—10YR or 2.5Y
Value—3 to 5 (2 to 4 moist)
Chroma—1 to 3
Texture—dominantly loam, silt loam, or clay loam; silty clay loam, fine sandy loam, or sandy loam in some pedons

Bk horizon:
Hue—10YR or 2.5Y
Value—3 to 6 (2 to 5 moist)
Chroma—1 to 4
Texture—dominantly loam, silt loam, or clay loam; silty clay loam, fine sandy loam, or sandy loam in some pedons

C horizon:
Hue—10YR or 2.5Y
Value—3 to 7 (2 to 5 moist)
Chroma—1 to 4
Texture—dominantly loam or clay loam; sandy loam, silt loam, or silty clay loam in some pedons

Davison Series

Depth to bedrock: Very deep
Drainage class: Moderately well drained
Permeability: Moderately slow
Landform: Till plains
Parent material: Glacial till
Slope range: 0 to 6 percent

Typical Pedon

Davison loam, in an area of Davison-Chancellor complex, 0 to 3 percent slopes, 1,620 feet east and 255 feet south of the northwest corner of sec. 36, T. 95 N., R. 53 W.

Ap—0 to 8 inches; dark gray (10YR 4/1) loam, black (10YR 2/1) moist; weak fine and medium subangular blocky structure parting to weak fine and medium granular; slightly hard, friable, slightly sticky and slightly plastic; many very fine and common fine roots throughout; common very fine tubular pores; slight effervescence; about 3 percent pebbles; slightly alkaline; abrupt smooth boundary.

Bk1—8 to 15 inches; grayish brown (2.5Y 5/2) loam, very dark grayish brown (2.5Y 3/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and few fine roots throughout; few fine and common very fine vesicular and tubular pores; few fine soft masses of carbonate; about 3 percent pebbles; strong effervescence; slightly alkaline; clear smooth boundary.

Bk2—15 to 24 inches; light brownish gray (2.5Y 6/2) loam, grayish brown (2.5Y 5/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots between peds; few fine and common very fine vesicular and tubular pores; common fine and medium soft masses of carbonate; about 3 percent pebbles; violent effervescence; moderately alkaline; clear wavy boundary.

Bk3—24 to 33 inches; pale yellow (2.5Y 7/3) clay loam, light olive brown (2.5Y 5/3) moist; common fine prominent brownish yellow (10YR 6/6) redox concentrations; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots between peds; few fine and common very fine vesicular and tubular pores; common fine soft masses of carbonate; about 3 percent pebbles; violent effervescence; moderately alkaline; gradual wavy boundary.

Bk4—33 to 47 inches; pale yellow (2.5Y 7/3) clay loam, light olive brown (2.5Y 5/3) moist; common fine distinct light brownish gray (2.5Y 6/2) redox depletions and common fine prominent brownish yellow (10YR 6/6) redox concentrations; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine roots between peds; few fine and common very fine vesicular and tubular pores; common fine soft masses of carbonate; about 3 percent pebbles; violent effervescence; slightly alkaline; gradual wavy boundary.

C—47 to 80 inches; pale yellow (2.5Y 7/3) clay loam, light yellowish brown (2.5Y 6/3) moist; many fine distinct light brownish gray (2.5Y 6/2) redox depletions and common fine prominent brownish yellow (10YR 6/6) redox concentrations; massive; hard, friable, slightly sticky and slightly plastic; few fine and common very fine vesicular and tubular pores; few fine and medium salt masses; about 3 percent pebbles; strong effervescence; slightly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 7 to 15 inches
Depth to carbonates: 0 to 6 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: 8 to more than 60 inches

A horizon:
Hue—10YR
Value—3 to 5 (2 or 3 moist)
Chroma—1 or 2
Texture—dominantly loam; very fine sandy loam, silt loam, or loamy fine sand in some pedons

Bk horizon:
Hue—2.5Y or 5Y
Value—5 to 7 (4 or 5 moist)
Chroma—2 to 4
Texture—dominantly loam or clay loam; sandy loam in some pedons

C horizon:
Hue—2.5Y or 5Y
Value—5 to 8 (4 to 6 moist)
Chroma—1 to 4
Texture—loam, sandy loam, fine sandy loam, silt loam, or clay loam

Delmont Series

Depth to bedrock: Very deep
Drainage class: Somewhat excessively drained

Permeability: Moderate in the upper part and rapid in the lower part
Landform: Outwash plains
Parent material: Glacial outwash
Slope range: 2 to 15 percent

Typical Pedon

Delmont loam, in an area of Delmont-Enet loams, 2 to 6 percent slopes, 1,355 feet south and 840 feet west of the northeast corner of sec. 9, T. 94 N., R. 52 W.

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) loam, black (10YR 2/1) moist; weak medium subangular blocky structure parting to weak fine granular; slightly hard, very friable, slightly sticky and slightly plastic; few fine and common very fine roots throughout; common very fine tubular pores; slightly acid; abrupt smooth boundary.

Bw1—6 to 11 inches; very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure parting to moderate fine subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots throughout; common very fine tubular pores; neutral; clear smooth boundary.

Bw2—11 to 18 inches; brown (10YR 4/3) loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots throughout; few fine and common very fine tubular pores; neutral; abrupt smooth boundary.

2C1—18 to 24 inches; brown (10YR 5/3) gravelly loamy sand, brown (10YR 4/3) moist; single grain; loose; many very fine interstitial pores; about 20 percent gravel; strong effervescence; slightly alkaline; clear smooth boundary.

2C2—24 to 80 inches; brown (7.5YR 5/3) gravelly sand, brown (7.5YR 4/3) moist; single grain; loose; many very fine interstitial pores; common carbonate coats on undersides of pebbles; about 25 percent gravel; violent effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 10 to 20 inches
Depth to carbonates: 14 to 20 inches
Depth to contrasting parent material: 14 to 20 inches over outwash sand and gravel
Depth to gypsum and other visible salts: More than 60 inches

A horizon:
Hue—10YR
Value—3 or 4 (2 or 3 moist)
Chroma—1 to 3
Texture—dominantly loam; very fine sandy loam or silt loam in some pedons

Bw horizon:
Hue—10YR
Value—3 to 5 (2 or 3 moist)
Chroma—1 to 3
Texture—dominantly loam; sandy loam or fine sandy loam in some pedons

2C horizon:
Hue—5YR to 5Y
Value—5 to 7 (4 to 6 moist)
Chroma—2 to 4
Texture—gravelly sand, gravelly loamy sand, very gravelly loamy sand, or very gravelly sand

Dimo Series

Depth to bedrock: Very deep
Drainage class: Somewhat poorly drained
Permeability: Moderate in the upper part and rapid or very rapid in the lower part
Landform: Flood plains
Parent material: Alluvium
Slope range: 0 to 2 percent

Typical Pedon

Dimo clay loam, 0 to 2 percent slopes, 1,090 feet east and 105 feet south of the northwest corner of sec. 23, T. 95 N., R. 52 W.

Ap—0 to 7 inches; dark gray (10YR 4/1) clay loam, black (10YR 2/1) moist; weak medium subangular blocky structure parting to moderate fine granular; hard, friable, slightly sticky and slightly plastic; common fine and very fine roots throughout; common very fine tubular pores; slightly acid; abrupt smooth boundary.

A—7 to 12 inches; dark gray (10YR 4/1) clay loam, black (10YR 2/1) moist; few fine distinct dark yellowish brown (10YR 4/4) redox concentrations; hard, friable, slightly sticky and slightly plastic; few fine and common very fine roots throughout; few fine and common very fine tubular pores; slightly acid; clear smooth boundary.

Bw1—12 to 23 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2 rubbed) moist; common fine distinct dark yellowish brown (10YR 4/4) redox concentrations; hard, friable, slightly sticky and slightly plastic; few very fine roots throughout; few fine and common very fine tubular pores; neutral; clear wavy boundary.

Bw2—23 to 30 inches; light olive brown (2.5Y 5/3) loam, olive brown (2.5Y 4/3 rubbed) moist; many fine prominent dark yellowish brown (10YR 4/6) redox concentrations; hard, friable, slightly sticky and slightly plastic; few very fine roots throughout; few fine and common very fine tubular pores; few fine iron-manganese concretions; neutral; abrupt smooth boundary.

2Bk—30 to 35 inches; grayish brown (2.5Y 5/2) gravelly sandy loam, dark grayish brown (2.5Y 4/2) moist; few fine prominent strong brown (7.5YR 5/8) and many fine prominent dark yellowish brown (10YR 4/6) redox concentrations; weak medium subangular blocky structure parting to single grain; loose; many very fine interstitial pores; few fine iron-manganese concretions; few fine carbonate concretions; about 20 percent gravel; strong effervescence; slightly alkaline; clear smooth boundary.

2C—35 to 80 inches; yellowish brown (10YR 5/4) gravelly sand, dark yellowish brown (10YR 4/4) moist; common fine prominent strong brown (7.5YR 5/6) and many fine distinct dark yellowish brown (10YR 4/6) redox concentrations; single grain; loose; many very fine interstitial pores; few fine iron-manganese concretions; about 20 percent gravel; strong effervescence; slightly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 20 to 40 inches
Depth to carbonates: 20 to 60 inches
Depth to contrasting parent material: 20 to 40 inches over outwash sand and gravel
Depth to gypsum and other visible salts: 40 to more than 60 inches

A horizon:
Hue—10YR or 2.5Y
Value—3 or 4 (2 moist)
Chroma—1 or 2
Texture—dominantly clay loam; loam, silt loam, or silty clay loam in some pedons

Bw horizon:
Hue—10YR, 2.5Y, or N
Value—3 to 5 (2 to 4 moist)
Chroma—0 to 2
Texture—dominantly clay loam; loam or sandy clay loam in some pedons

2Bk horizon:
Hue—2.5Y
Value—5 to 7 (4 to 6 moist)
Chroma—1 to 3
Texture—gravelly sandy loam or gravelly loam

2C horizon:
Hue—7.5YR, 10YR, or 2.5Y
Value—5 to 7 (4 to 6 moist)
Chroma—2 to 4
Texture—gravelly sand, gravelly loamy sand, very gravelly sand, or very gravelly loamy sand

Egan Series

Depth to bedrock: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Landform: Till plains
Parent material: Glacial till
Slope range: 0 to 9 percent

Typical Pedon

Egan silty clay loam (fig. 20), in an area of Egan-Clarno-Trent complex, 0 to 2 percent slopes, 2,400 feet south and 270 feet west of the northeast corner of sec. 2, T. 95 N., R. 52 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silty clay loam, black (10YR 2/1) moist; weak medium subangular blocky structure parting to moderate fine and medium granular; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots throughout; common very fine tubular pores; slightly acid; abrupt smooth boundary.

Bw1—8 to 16 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots throughout; few fine and common very fine tubular pores; neutral; clear smooth boundary.

Bw2—16 to 26 inches; brown (10YR 5/3) silty clay loam, dark grayish brown (10YR 4/2) moist; weak medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; few fine and very fine roots between peds; few fine and common very fine vesicular and tubular pores; neutral; abrupt smooth boundary.

Bk1—26 to 34 inches; light yellowish brown (2.5Y 6/4) silty clay loam, olive brown (2.5Y 4/4) moist; moderate medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few fine roots between peds; few fine and common very fine vesicular and tubular pores; few fine and medium soft masses of carbonate; strong effervescence; moderately alkaline; clear wavy boundary.

2Bk2—34 to 41 inches; light yellowish brown (2.5Y 6/4) clay loam, olive brown (2.5Y 4/4) moist; moderate medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few fine roots between peds; common fine and few medium soft masses of carbonate; about 3 percent pebbles; strong effervescence; moderately alkaline; clear wavy boundary.

2Bk3—41 to 54 inches; light yellowish brown (2.5Y 6/4) clay loam, olive brown (2.5Y 4/4) moist; few fine distinct strong brown (7.5YR 5/6) and few fine prominent yellowish red (5YR 5/8) redox concentrations; few fine distinct light gray (2.5Y 7/1) redox depletions; weak medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few fine and common very fine vesicular and tubular pores; common fine and few medium soft masses of carbonate; about 5 percent pebbles; strong effervescence; moderately alkaline; clear wavy boundary.

2C—54 to 80 inches; pale yellow (2.5Y 7/4) clay loam, light olive brown (2.5Y 5/4) moist; common fine prominent strong brown (7.5YR 5/6) and few fine and medium prominent yellowish red (5YR 5/8) redox concentrations; many fine and medium distinct light gray (2.5Y 7/1) redox depletions; massive; hard, firm, slightly sticky and slightly plastic; common fine and many very fine vesicular and tubular pores; about 5 percent pebbles; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 8 to 19 inches
Depth to carbonates: 15 to 30 inches
Depth to contrasting parent material: 24 to 40 inches over loamy glacial till
Depth to gypsum and other visible salts: More than 60 inches
Other features: Some areas have a sandy or gravelly layer a few inches thick at the interface of the glacial till.

A horizon:
Hue—10YR
Value—3 or 4 (2 or 3 moist)
Chroma—1 or 2
Texture—silty clay loam or silt loam

Bw horizon:
Hue—10YR or 2.5Y
Value—4 to 6 (3 or 4 moist)
Chroma—2 to 4
Texture—silty clay loam or silt loam

Bk horizon:
Hue—2.5Y or 5Y
Value—5 to 7 (4 to 6 moist)
Chroma—2 to 4
Texture—silty clay loam or silt loam

2Bk horizon:
Hue—2.5Y or 5Y
Value—5 to 7 (4 to 6 moist)
Chroma—2 to 4
Texture—clay loam or loam

2C horizon:
Hue—2.5Y or 5Y
Value—5 to 7 (4 to 6 moist)
Chroma—2 to 4
Texture—loam or clay loam

Enet Series

Depth to bedrock: Very deep
Drainage class: Well drained
Permeability: Moderate in the upper part and rapid in the lower part
Landform: Outwash plains or flood plains
Parent material: Glacial outwash or alluvium
Slope range: 0 to 6 percent

Typical Pedon

Enet loam, in an area of Delmont-Enet loams, 2 to 6 percent slopes, 1,345 feet south and 910 feet west of the northeast corner of sec. 9, T. 94 N., R. 52 W.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure parting to moderate fine granular; slightly hard, friable, slightly sticky and slightly plastic; few fine and common very fine roots throughout; common very fine tubular pores; neutral; abrupt smooth boundary.

Bw1—6 to 11 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure parting to moderate fine subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots throughout; common very fine tubular pores; neutral; clear smooth boundary.

Bw2—11 to 26 inches; brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots throughout; few fine and common very fine tubular pores; neutral; abrupt smooth boundary.

2C1—26 to 33 inches; brown (10YR 4/3) gravelly loamy sand, dark brown (10YR 3/3) moist; single grain; loose; many very fine interstitial pores; many carbonate coats on undersides of pebbles; about 20 percent gravel; violent effervescence; moderately alkaline; clear wavy boundary.

2C2—33 to 60 inches; brown (10YR 5/3) gravelly sand, brown (10YR 4/3) moist; single grain; loose; many very fine interstitial pores; common carbonate coats on undersides of pebbles; about 25 percent gravel; strong effervescence; moderately alkaline; gradual wavy boundary.

2C3—60 to 70 inches; yellowish brown (10YR 5/4) gravelly sand, dark yellowish brown (10YR 4/4) moist; single grain; loose; many very fine interstitial pores; few carbonate coats on undersides of pebbles; strong effervescence; about 25 percent gravel; slightly alkaline; gradual wavy boundary.

2C4—70 to 80 inches; brown (10YR 5/3) gravelly sand, brown (10YR 4/3) moist; single grain; loose; many very fine interstitial pores; few carbonate coats on undersides of pebbles; about 25 percent gravel; strong effervescence; slightly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 20 to 40 inches
Depth to carbonates: 20 to 40 inches
Depth to contrasting parent material: 20 to 40 inches over outwash sand and gravel or sandy alluvium
Depth to gypsum and other visible salts: More than 60 inches
Other features: Some pedons do not have coarse fragments in the 2C horizon. Some pedons do not meet the depth criteria for the Pachic subgroup.

A horizon:
Hue—10YR
Value—3 or 4 (2 or 3 moist)
Chroma—1 or 2
Texture—dominantly loam; silt loam or fine sandy loam in some pedons

Bw horizon:
Hue—10YR or 2.5Y
Value—3 to 5 (2 to 4 moist)
Chroma—1 to 4
Texture—dominantly loam or silt loam; clay loam, sandy clay loam, fine sandy loam, or silty clay loam in some pedons

2C horizon:
Hue—10YR or 2.5Y
Value—5 to 7 (3 to 6 moist)
Chroma—2 to 4
Texture—dominantly gravelly loamy sand, gravelly sand, very gravelly loamy sand, very gravelly sand, loamy fine sand, or fine sand; loamy sand or sand in some pedons

Ethan Series

Depth to bedrock: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Landform: Till plains
Parent material: Glacial till
Slope range: 2 to 40 percent

Typical Pedon

Ethan loam (fig. 21), in an area of Ethan-Clarno loams, 6 to 9 percent slopes, 2,250 feet north and 100 feet east of the southwest corner of sec. 32, T. 95 N., R. 53 W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure parting to weak medium granular and moderate fine granular; slightly hard, very friable, slightly sticky and slightly plastic; many fine and very fine roots throughout; common very fine vesicular and tubular pores; few fine soft masses of carbonate; about 3 percent pebbles; strong effervescence; slightly alkaline; abrupt smooth boundary.

Bk1—8 to 22 inches; light yellowish brown (2.5Y 6/4) clay loam, olive brown (2.5Y 4/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots throughout; common fine and medium soft masses of carbonate; about 3 percent pebbles; violent effervescence; moderately alkaline; clear smooth boundary.

Bk2—22 to 30 inches; pale yellow (2.5Y 7/4) clay loam, light olive brown (2.5Y 5/4) moist; few fine prominent yellowish brown (10YR 5/6) redox concentrations; moderate medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few fine roots between peds; few fine and common very fine vesicular and tubular pores; many fine and common medium soft masses of carbonate; about 3 percent pebbles; violent effervescence; moderately alkaline; gradual wavy boundary.

Bk3—30 to 51 inches; pale yellow (2.5Y 7/4) clay loam, light olive brown (2.5Y 5/4) moist; common fine prominent yellowish brown (10YR 5/6) and few fine and medium prominent yellowish red (5YR 5/8) redox concentrations; weak coarse subangular blocky structure parting to moderate medium subangular blocky; hard, firm, slightly sticky and slightly plastic; few fine and common very fine vesicular and tubular pores; common fine and medium soft masses of carbonate; about 3 percent pebbles; violent effervescence; moderately alkaline; gradual wavy boundary.

C—51 to 80 inches; pale yellow (2.5Y 7/4) clay loam, light yellowish brown (2.5Y 6/4) moist; few fine, medium, and coarse prominent yellowish red (5YR 5/8) and common fine prominent yellowish brown (10YR 5/6) redox concentrations; few fine prominent gray (2.5Y 6/1) redox depletions; massive; very hard, very firm, slightly sticky and slightly plastic; few fine and common very fine vesicular and tubular pores; about 3 percent pebbles; strong effervescence; slightly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 7 to 10 inches
Depth to carbonates: 0 to 5 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: More than 60 inches

A horizon:
Hue—10YR or 2.5Y
Value—3 to 5 (2 or 3 moist)
Chroma—2 or 3
Texture—dominantly loam; clay loam, silt loam, gravelly loam, loamy fine sand, or sandy loam in some pedons

Bk horizon:
Hue—10YR or 2.5Y
Value—5 to 7 (3 to 6 moist)
Chroma—2 to 4
Texture—loam or clay loam

C horizon:
Hue—2.5Y or 5Y
Value—5 to 8 (4 to 6 moist)
Chroma—2 to 4
Texture—dominantly loam or clay loam; silt loam or fine sandy loam in some pedons

Forney Series

Depth to bedrock: Very deep
Drainage class: Somewhat poorly drained
Permeability: Very slow
Landform: Flood plains
Parent material: Alluvium
Slope range: 0 to 2 percent

Typical Pedon

Forney silty clay, 0 to 2 percent slopes (fig. 22), 2,520 feet east and 185 feet south of the northwest corner of sec. 36, T. 92 N., R. 51 W.

Ap—0 to 8 inches; dark grayish brown (2.5Y 4/2) silty clay, very dark gray (2.5Y 3/1) moist; weak fine and medium subangular blocky structure; hard, friable, sticky and plastic; few fine and common very fine roots throughout; common very fine tubular pores; slightly acid; abrupt smooth boundary.

C—8 to 16 inches; grayish brown (2.5Y 5/2) silty clay with black (2.5Y 2.5/1) stains and light olive brown (2.5Y 5/3) strata less than 1/4 inch thick; dark grayish brown (2.5Y 4/2) moist; few fine distinct light olive brown (2.5Y 5/4) redox concentrations; weak medium subangular blocky structure; hard, friable, sticky and plastic; few fine and very fine roots throughout; common very fine tubular pores; slight effervescence; slightly alkaline; abrupt smooth boundary.

2Ab—16 to 36 inches; dark gray (5Y 4/1) silty clay, black (5Y 2.5/1) moist; few fine prominent dark yellowish brown (10YR 4/6) redox concentrations; weak fine and medium subangular blocky structure; hard, friable, sticky and plastic; few very fine roots between peds; few fine and common very fine tubular pores; common dark grayish brown (2.5Y 4/2 moist) and very dark grayish brown (2.5Y 3/2 moist) wormcasts; few fine carbonate concretions; neutral; clear smooth boundary.

2Bgb—36 to 48 inches; gray (5Y 6/1) silty clay, dark gray (5Y 4/1) moist; common fine and medium distinct olive brown (2.5Y 4/4) redox concentrations; weak fine and medium subangular blocky structure; very hard, firm, sticky and plastic; few very fine roots between peds; few fine and common very fine tubular pores; few black (2.5Y 2.5/1) stains along root channels; few fine iron-manganese concretions; few fine carbonate concretions; slightly alkaline; gradual wavy boundary.

2Cg1—48 to 68 inches; light olive gray (5Y 6/2) silty clay, olive gray (5Y 4/2) moist; common fine and medium prominent olive brown (2.5Y 4/4) and common fine prominent dark yellowish brown (10YR 4/6) redox concentrations; massive; very hard, firm, sticky and plastic; few very fine roots between peds; few fine and many very fine tubular pores; few fine iron-manganese concentrations;

few medium carbonate concretions; slight effervescence; slightly alkaline; abrupt smooth boundary.

3Cg2—68 to 80 inches; light brownish gray (2.5Y 6/2) silt loam, grayish brown (2.5Y 5/2) moist; common fine and medium distinct olive brown (2.5Y 4/4) and common fine prominent dark yellowish brown (10YR 4/6) redox concentrations; common fine and medium faint gray (2.5Y 5/1) redox depletions; massive; slightly hard, very friable, slightly sticky and slightly plastic; common very fine tubular pores; common fine iron-manganese concretions; few medium carbonate concretions; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 4 to 10 inches
Depth to carbonates: 36 to 60 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: More than 60 inches
Other features: The drainage class in areas on the flood plain along the Missouri River is one class better than is typical for the series and is a result of downcutting by the river. Some pedons do not have a 3Cg2 horizon of silt loam. This horizon is not included in the engineering index properties table.

A horizon:
Hue—10YR, 2.5Y, or N
Value—3 to 5 (2 or 3 moist)
Chroma—0 to 2
Texture—silty clay or clay

C horizon:
Hue—2.5Y or 5Y
Value—5 to 7 (4 or 5 moist)
Chroma—1 or 2
Texture—silty clay

2Ab horizon:
Hue—2.5Y, 5Y, or N
Value—3 to 5 (2 or 3 moist)
Chroma—0 or 1
Texture—dominantly silty clay or clay; silty clay loam in some pedons

2Bgb or 2Cg horizon:
Hue—2.5Y or 5Y
Value—5 to 7 (4 or 5 moist)
Chroma—1 or 2
Texture—dominantly silty clay or clay; silty clay loam in some pedons

3Cg horizon:
Hue—2.5Y or 5Y
Value—5 to 7 (4 or 5 moist)
Chroma—1 or 2
Texture—silt loam

Gayville Series

Depth to bedrock: Very deep
Drainage class: Somewhat poorly drained
Permeability: Very slow
Landform: Flood plains
Parent material: Alluvium
Slope range: 0 to 2 percent

Typical Pedon

Gayville silt loam, in an area of Blyburg-Gayville silt loams, 0 to 2 percent slopes, 775 feet east and 450 feet north of the southwest corner of sec. 31, T. 94 N., R. 53 W.

E—0 to 1 inch; gray (10YR 6/1) silt loam, dark gray (10YR 4/1) moist; weak thin platy structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine and many very fine roots throughout; common fine and many very fine tubular pores; moderately alkaline; abrupt smooth boundary.

Btny1—1 to 7 inches; very dark gray (10YR 3/1) silty clay, black (10YR 2/1) moist; weak coarse columnar structure parting to weak medium subangular blocky; very hard, firm, sticky and plastic; common fine and many very fine roots throughout; common fine and many very fine tubular pores; some tonguing of material from the E horizon on column tops; common fine patchy clay films; few fine masses of gypsum; strong effervescence; strongly alkaline; clear smooth boundary.

Btny2—7 to 12 inches; dark gray (10YR 4/1) silty clay, very dark gray (10YR 3/1) moist; common black (10YR 2/1) stains along root channels and cracks; weak coarse prismatic structure parting to moderate medium subangular blocky; very hard, firm, sticky and plastic; few fine and common very fine roots throughout; common fine and many very fine tubular pores; few fine masses of gypsum; common fine patchy clay films; strong effervescence; strongly alkaline; clear smooth boundary.

Btny3—12 to 18 inches; grayish brown (2.5Y 5/2) silty clay loam, very dark grayish brown (2.5Y 3/2) moist; common fine distinct olive brown (2.5Y 4/4) redox concentrations; weak coarse prismatic structure parting to moderate medium subangular blocky; very hard, firm, sticky and plastic; few fine and common very fine roots throughout; few fine and common very fine tubular pores; common fine patchy clay films; common black (10YR 2/1) stains along root channels and cracks; few fine iron-manganese concretions; common fine masses of gypsum; strong effervescence; strongly alkaline; clear wavy boundary.

Bky—18 to 31 inches; pale yellow (2.5Y 7/3) loam, light olive brown (2.5Y 5/3) moist; few fine distinct light olive brown (2.5Y 5/6) redox concentrations and common fine and medium distinct grayish brown (2.5Y 5/2) redox depletions; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine roots throughout; few fine and common very fine tubular pores; few very dark gray (10YR 3/1) stains along root channels and cracks; common fine soft masses of carbonate; few fine iron-manganese concretions; few fine masses of gypsum; violent effervescence; strongly alkaline; clear smooth boundary.

C—31 to 80 inches; pale yellow (2.5Y 7/3) very fine sandy loam with thin strata of silt loam and silty clay loam; light olive brown (2.5Y 5/3) moist; few fine prominent strong brown (7.5YR 5/6) and common fine distinct light olive brown (2.5Y 5/6) redox concentrations; few fine distinct gray (2.5Y 5/1) and common fine and medium distinct grayish brown (2.5Y 5/2) redox depletions; massive; hard, friable, slightly sticky and slightly plastic; few very fine roots in the upper part; few fine and common very fine vesicular and tubular pores; few fine iron-manganese concretions; strong effervescence; strongly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 8 to 20 inches
Depth to carbonates: 0 to 16 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: 9 to 18 inches

E horizon:
Hue—10YR
Value—5 to 7 (3 to 5 moist)
Chroma—1
Texture—silt loam or silty clay loam

Btny horizon:
Hue—10YR or 2.5Y
Value—3 to 5 (2 or 3 moist)
Chroma—1 or 2
Texture—silty clay loam or silty clay

Bky horizon:
Hue—10YR, 2.5Y, or 5Y
Value—5 to 7 (3 to 5 moist)
Chroma—2 to 4
Texture—very fine sandy loam, loam, clay loam, or silty clay loam

C horizon:
Hue—10YR, 2.5Y, or 5Y
Value—6 to 8 (4 to 7 moist)
Chroma—2 to 4
Texture—dominantly very fine sandy loam or loam with thin strata of silt loam and silty clay loam; strata of clay loam, very fine sand, or fine sand in some pedons

Grable Series

Depth to bedrock: Very deep
Drainage class: Well drained
Permeability: Moderate in the upper part and rapid in the lower part
Landform: Flood plains
Parent material: Alluvium
Slope range: 0 to 3 percent

Typical Pedon

Grable silt loam (fig. 23), in an area of Haynie-Grable silt loams, 0 to 2 percent slopes, 2,200 feet south and 1,600 feet west of the northeast corner of sec. 15, T. 92 N., R. 53 W.

Ap—0 to 8 inches; dark grayish brown (2.5Y 4/2) silt loam, very dark grayish brown (2.5Y 3/2) moist; weak medium subangular blocky structure parting to weak fine granular; slightly hard, very friable, slightly sticky and slightly plastic; common fine and very fine roots throughout; common very fine vesicular and tubular pores; slight effervescence; slightly alkaline; abrupt smooth boundary.

C1—8 to 26 inches; grayish brown (2.5Y 5/2) very fine sandy loam with thin strata of loamy very fine sand, very fine sand, and silt loam; dark grayish brown (2.5Y 4/2) moist; few fine prominent yellowish brown (10YR 5/6) redox concentrations; massive; soft, very friable; common very fine roots throughout; common very fine vesicular and tubular pores; strong effervescence; moderately alkaline; abrupt smooth boundary.

2C2—26 to 72 inches; light brownish gray (2.5Y 6/2) fine sand, grayish brown (2.5Y 5/2) moist; few fine prominent yellowish brown (10YR 5/6) redox concentrations; single grain; loose; few very fine roots in the upper part; common very fine vesicular and tubular pores; strong effervescence; moderately alkaline; clear smooth boundary.

3C3—72 to 80 inches; light brownish gray (2.5Y 6/2) and grayish brown (2.5Y 5/2) very fine sandy loam with thin strata of very fine sand, silty loam, and silty clay loam; grayish brown (2.5Y 5/2) and dark grayish brown (2.5Y 4/2) moist; common fine prominent yellowish brown (10YR 5/6) redox concentrations; massive; soft, very friable; common very fine vesicular and tubular pores; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 6 to 10 inches
Depth to carbonates: 0 to 10 inches
Depth to contrasting parent material: 18 to 30 inches over sandy alluvium
Depth to gypsum and other visible salts: More than 60 inches
Other features: Some pedons do not have a 3C horizon of very fine sandy loam. This horizon is not included in the engineering index properties table.

A horizon:
Hue—10YR or 2.5Y
Value—4 or 5 (3 moist)
Chroma—1 to 3
Texture—dominantly silt loam; loam, very fine sandy loam, or silty clay loam in some pedons

C horizon:
Hue—10YR or 2.5Y
Value—5 or 6 (4 or 5 moist)
Chroma—2
Texture—silt loam or very fine sandy loam with thin strata of loamy very fine sand and very fine sand

2C horizon:
Hue—2.5Y
Value—5 or 6 (4 or 5 moist)
Chroma—2
Texture—fine sand, sand, or loamy sand

3C horizon (if it occurs):
Hue—2.5Y
Value—5 or 6 (4 or 5 moist)
Chroma—2
Texture—very fine sandy loam with thin strata of very fine sand, fine sand, silt loam, and silty clay loam

Haynie Series

Depth to bedrock: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Flood plains
Parent material: Alluvium
Slope range: 0 to 2 percent

Typical Pedon

Haynie silt loam, in an area of Haynie-Lossing-Grable complex, 0 to 2 percent slopes, 2,085 feet north and 400 feet west of the southeast corner of sec. 18, T. 92 N., R. 52 W.

Ap—0 to 9 inches; dark grayish brown (2.5Y 4/2) silt loam, very dark grayish brown (2.5Y 3/2) moist; weak fine and medium subangular blocky structure parting to moderate fine granular; slightly hard, very friable; common fine and very fine roots throughout; common very fine vesicular and tubular pores; slight effervescence; slightly alkaline; abrupt smooth boundary.

C—9 to 80 inches; grayish brown (2.5Y 5/2) silt loam with thin strata of very fine sandy loam, loamy fine sand, silty clay loam, and silty clay; dark grayish brown (2.5Y 4/2) moist; common fine prominent yellowish brown (10YR 5/6) and few fine prominent strong brown (7.5YR 4/6) redox concentrations; few fine prominent gray (5Y 6/1) redox depletions in the lower part; no redox concentrations in some strata; massive; slightly hard, very friable; few fine roots in the upper part; few fine and common very fine vesicular and tubular pores; strong effervescence; slightly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 6 to 10 inches
Depth to carbonates: 0 to 10 inches
Depth to contrasting parent material: 40 to more than 60 inches over sandy alluvium
Depth to gypsum and other visible salts: More than 60 inches

A horizon:
Hue—10YR or 2.5Y
Value—4 (3 moist)
Chroma—2
Texture—dominantly silt loam; very fine sandy loam or silty clay loam in some pedons

C horizon:
Hue—10YR or 2.5Y

Value—5 or 6 (4 or 5 moist)
Chroma—2
Texture—dominantly silt loam or very fine sandy loam with strata of very fine sandy loam, loamy fine sand, silty clay loam, and silty clay; fine sand or sand below a depth of 60 inches in some pedons

James Series

Depth to bedrock: Very deep
Drainage class: Poorly drained
Permeability: Slow or very slow
Landform: Flood plains
Parent material: Alluvium
Slope range: 0 to 1 percent

Typical Pedon

James silty clay, 0 to 1 percent slopes, 1,900 feet east and 300 feet south of the northwest corner of sec. 11, T. 93 N., R. 53 W.

Az1—0 to 8 inches; very dark gray (10YR 3/1) silty clay, black (10YR 2/1) moist; weak fine subangular blocky structure; hard, firm, sticky and plastic; common fine and very fine roots throughout; common very fine vesicular and tubular pores; few fine salt masses; slight effervescence; slightly alkaline; abrupt smooth boundary.

Az2—8 to 16 inches; very dark gray (N 3/0) silty clay, black (N 2.5/0) moist; weak fine granular structure; hard, firm, sticky and plastic; common fine and very fine roots throughout; few fine and common very fine vesicular and tubular pores; few fine and medium salt masses; slight effervescence; slightly alkaline; clear smooth boundary.

Bz—16 to 22 inches; very dark gray (N 3/0) silty clay, black (N 2.5/0) moist; weak medium prismatic structure parting to weak fine granular; hard, firm, sticky and plastic; common fine and very fine roots throughout; few fine and common very fine vesicular and tubular pores; few fine and medium salt masses; slight effervescence; slightly alkaline; clear smooth boundary.

Bzy1—22 to 38 inches; very dark gray (N 3/0) silty clay, black (N 2.5/0) moist; weak medium prismatic structure parting to moderate fine subangular blocky; hard, firm, sticky and plastic; few fine roots between peds; few fine and common very fine vesicular and tubular pores; few fine and medium salt masses; common fine and medium nests of gypsum; slight effervescence; slightly alkaline; clear smooth boundary.

Bzy2—38 to 50 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; common fine prominent dark yellowish brown (10YR 4/6) redox concentrations; weak medium subangular blocky structure; hard, firm, sticky and plastic; few fine and common very fine vesicular and tubular pores; few fine and medium salt masses and nests of gypsum; slight effervescence; slightly alkaline; gradual wavy boundary.

Akyssb—50 to 58 inches; dark gray (5Y 4/1) silty clay, very dark gray (5Y 3/1) moist; few fine prominent dark yellowish brown (10YR 4/6) redox concentrations; massive; very hard, very firm, sticky and plastic; few fine and common very fine vesicular and tubular pores; common continuous distinct nonintersecting slickensides on vertical faces of peds; few fine and medium nests of gypsum; few fine soft masses of carbonate; slight effervescence; slightly alkaline; gradual wavy boundary.

Cssy—58 to 80 inches; olive gray (5Y 5/2) silty clay, olive gray (5Y 4/2) moist; common fine and medium prominent light olive brown (2.5Y 5/4) redox concentrations; massive; very hard, very firm, sticky and plastic; few fine and common very fine vesicular and tubular pores; few continuous distinct nonintersecting slickensides on vertical faces of peds; few fine and medium iron-manganese concretions; few fine soft masses of carbonate; few fine and medium nests of gypsum; slight effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 24 to more than 60 inches
Depth to carbonates: 0 to 10 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: 0 to 8 inches

A horizon:
Hue—10YR, 2.5Y, 5Y, or N
Value—3 or 4 (2 or 3 moist)
Chroma—0 or 1
Texture—dominantly silty clay; silty clay loam or clay in some pedons

Bz and Bzy horizons:
Hue—2.5Y, 5Y, or N
Value—3 or 4 (2 or 3 moist)
Chroma—0 to 2
Texture—dominantly silty clay; silty clay loam or clay in some pedons

C horizon:

Hue—2.5Y, 5Y, or N
Value—4 to 6 (2 to 5 moist)
Chroma—0 to 2
Texture—dominantly silty clay; silty clay loam or clay in some pedons

Lakeport Series

Depth to bedrock: Very deep
Drainage class: Moderately well drained
Permeability: Moderately slow
Landform: Flood plains
Parent material: Alluvium
Slope range: 0 to 2 percent

Typical Pedon

Lakeport silty clay loam, 0 to 2 percent slopes, 1,500 feet south and 450 feet west of the northeast corner of sec. 26, T. 92 N., R. 51 W.

Ap—0 to 7 inches; dark gray (10YR 4/1) silty clay loam, black (10YR 2/1) moist; moderate medium subangular blocky structure parting to moderate fine granular; hard, friable, sticky and plastic; few fine and very fine roots throughout; few medium, fine, and very fine vesicular and tubular pores; slightly acid; abrupt smooth boundary.

A1—7 to 12 inches; dark gray (10YR 4/1) silty clay loam, black (10YR 2/1) moist; moderate medium subangular blocky structure parting to moderate fine subangular blocky; hard, friable, sticky and plastic; few fine and very fine roots throughout; few fine and common very fine vesicular and tubular pores; slightly acid; clear smooth boundary.

A2—12 to 17 inches; dark gray (10YR 4/1) silty clay loam, very dark gray (10YR 3/1) moist; moderate medium subangular blocky structure parting to moderate fine subangular blocky; hard, friable, sticky and plastic; few fine and very fine roots throughout; few fine and common very fine vesicular and tubular pores; slightly acid; clear smooth boundary.

BA—17 to 22 inches; dark grayish brown (2.5Y 4/2) silty clay loam, very dark grayish brown (2.5Y 3/2) moist; few fine prominent dark yellowish brown (10YR 4/4) redox concentrations; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine and very fine roots between peds; few fine and common very fine vesicular and tubular pores; neutral; clear smooth boundary.

Bw—22 to 38 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; few fine prominent dark yellowish brown (10YR 4/4) redox concentrations and few fine prominent dark gray (2.5Y 4/1) redox depletions; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine and very fine roots between peds; few fine and common very fine vesicular and tubular pores; slightly alkaline; abrupt smooth boundary.

C1—38 to 58 inches; light brownish gray (2.5Y 6/2) silt loam, grayish brown (2.5Y 5/2) moist; common fine prominent dark yellowish brown (10YR 4/4) redox concentrations and common fine and medium distinct gray (2.5Y 5/1) redox depletions; massive; slightly hard, very friable; few fine and common very fine vesicular and tubular pores; strong effervescence; moderately alkaline; clear smooth boundary.

C2—58 to 80 inches; light brownish gray (2.5Y 6/2) very fine sandy loam, grayish brown (2.5Y 5/2) moist; common fine dark prominent yellowish brown (10YR 4/4) redox concentrations and common fine and medium distinct gray (2.5Y 5/1) redox depletions; massive; slightly hard, very friable; few fine and common very fine vesicular and tubular pores; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 16 to 24 inches
Depth to carbonates: 36 to more than 60 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: More than 60 inches
Other features: The drainage class in areas on the flood plain along the Missouri River is one class better than is typical for the series and is a result of downcutting by the river.

A horizon:

Hue—10YR or 2.5Y
Value—3 or 4 (2 or 3 moist)
Chroma—1 or 2
Texture—dominantly silty clay loam; silt loam or silty clay in some pedons

Bw horizon:

Hue—10YR or 2.5Y
Value—4 to 6 (2 to 4 moist)
Chroma—1 to 3
Texture—silty clay loam or silty clay

C horizon:

Hue—2.5Y or 5Y
Value—5 to 7 (4 to 6 moist)

Chroma—2 to 4
Texture—dominantly silt loam or very fine sandy loam; loam in some pedons

Lamo Series

Depth to bedrock: Very deep
Drainage class: Somewhat poorly drained
Permeability: Moderately slow throughout or moderately slow in the upper part and rapid in the lower part
Landform: Flood plains
Parent material: Alluvium
Slope range: 0 to 2 percent

Typical Pedon

Lamo silty clay loam, in an area of Lamo-Baltic silty clay loams, 0 to 2 percent slopes, 130 feet south and 60 feet east of the northwest corner of sec. 24, T. 94 N., R. 52 W.

Ap—0 to 10 inches; dark gray (10YR 4/1) silty clay loam, very dark gray (10YR 3/1) moist; weak fine and medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine and very fine roots throughout; common very fine tubular pores; strong effervescence; slightly alkaline; abrupt smooth boundary.

Bk1—10 to 30 inches; grayish brown (2.5Y 5/2) silty clay loam, very dark grayish brown (2.5Y 3/2) moist; few fine prominent dark yellowish brown (10YR 4/4) redox concentrations; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine roots throughout; few fine and many very fine tubular pores; common fine soft masses of carbonate; violent effervescence; moderately alkaline; clear smooth boundary.

Bk2—30 to 39 inches; grayish brown (2.5Y 5/2) silty clay loam, very dark grayish brown (2.5Y 3/2) moist; common fine prominent dark yellowish brown (10YR 4/4) redox concentrations; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine roots throughout; few fine and many very fine tubular pores; few fine and medium soft masses of carbonate; violent effervescence; moderately alkaline; clear smooth boundary.

Cg1—39 to 47 inches; light brownish gray (2.5Y 6/2) silty clay loam with thin strata of silt loam and silty clay; dark grayish brown (2.5Y 4/2) moist; many fine prominent dark yellowish brown (10YR 4/4) redox concentrations; weak thin and medium platy structure resulting from layering of sediments; hard, friable, slightly sticky and slightly plastic; few very fine roots throughout; few fine and many very fine tubular pores; violent effervescence; moderately alkaline; abrupt smooth boundary.

Cg2—47 to 58 inches; grayish brown (2.5Y 5/2) and gray (2.5Y 5/1) silty clay with thin strata of silty clay loam and silt loam; very dark grayish brown (2.5Y 3/2) and very dark gray (2.5Y 3/1) moist; many fine distinct olive brown (2.5Y 4/4) redox concentrations; weak thin platy structure resulting from layering of sediments; very hard, firm, sticky and plastic; few fine and many very fine tubular pores; violent effervescence; moderately alkaline; abrupt smooth boundary.

Cg3—58 to 65 inches; light gray (2.5Y 7/2), light brownish gray (2.5Y 6/2), and grayish brown (2.5Y 5/2) silt loam with thin strata of silty clay loam and silty clay; grayish brown (2.5Y 5/2), dark grayish brown (2.5Y 4/2), and very dark grayish brown (2.5Y 3/2) moist; many fine distinct olive brown (2.5Y 4/4) redox concentrations and few fine distinct gray (2.5Y 5/1) redox depletions; weak thin platy structure resulting from layering of sediments; hard, friable, slightly sticky and slightly plastic; few fine and many very fine tubular pores; few fine salt masses; violent effervescence; moderately alkaline; abrupt smooth boundary.

Cg4—65 to 80 inches; light gray (2.5Y 7/2), light brownish gray (2.5Y 6/2), and grayish brown (2.5Y 5/2) silty clay loam with thin strata of silt loam and silty clay; grayish brown (2.5Y 5/2), dark grayish brown (2.5Y 4/2), and very dark grayish brown (2.5Y 3/2) moist; common fine and few medium distinct olive brown (2.5Y 4/4), few fine prominent dark yellowish brown (10YR 4/6), and few fine prominent strong brown (7.5YR 5/8) redox concentrations; few fine distinct gray (2.5Y 5/1) redox depletions; weak thin platy structure resulting from layering of sediments; hard, friable, slightly sticky and slightly plastic; few fine and many very fine tubular pores; few fine salt masses; violent effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 24 to 39 inches
Depth to carbonates: 0 to 10 inches
Depth to contrasting parent material: 40 to more than 60 inches over sandy alluvium
Depth to gypsum and other visible salts: 30 to more than 60 inches
Other features: Some pedons do not have a Cg2 horizon of silty clay. This texture is not included in the engineering index properties table.

Figure 19.—A profile of Albaton silty clay. Stratified clayey textures occur at a depth of about 9 inches. Depth is marked in feet.

Figure 20.—A profile of Egan silty clay loam. Mollic colors extend from the surface to a depth of about 16 inches. Loamy glacial till is at a depth of about 30 inches. Depth is marked in feet.

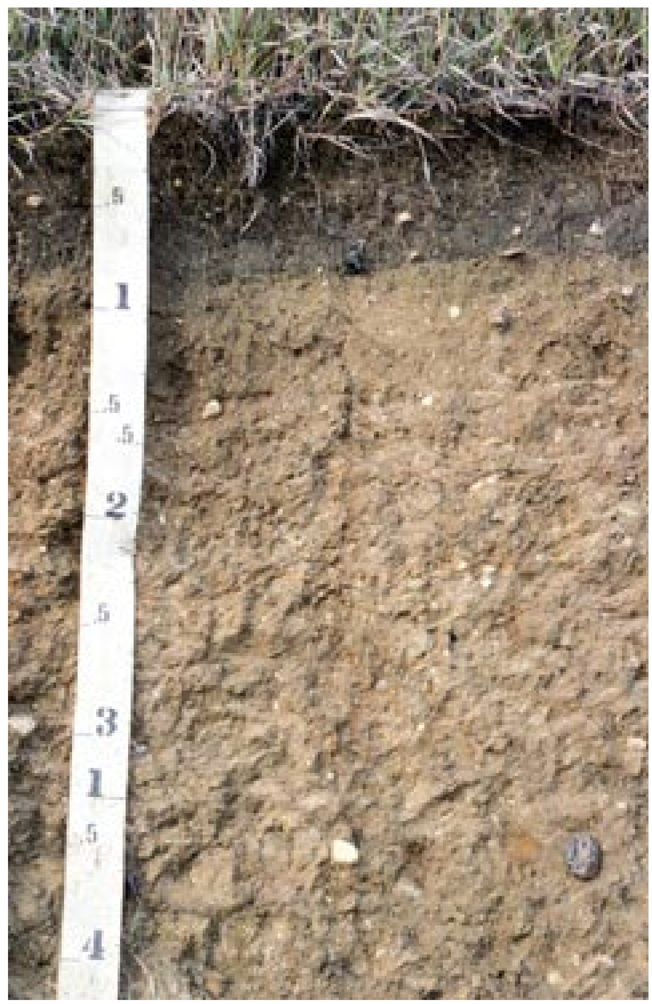

Figure 21.—A profile of Ethan loam. The soil is calcareous to the surface. A buildup of carbonates is at a depth of about 25 inches. Mollic colors are limited to the plow layer (from the surface to a depth of about 8 inches). Depth is marked in feet.

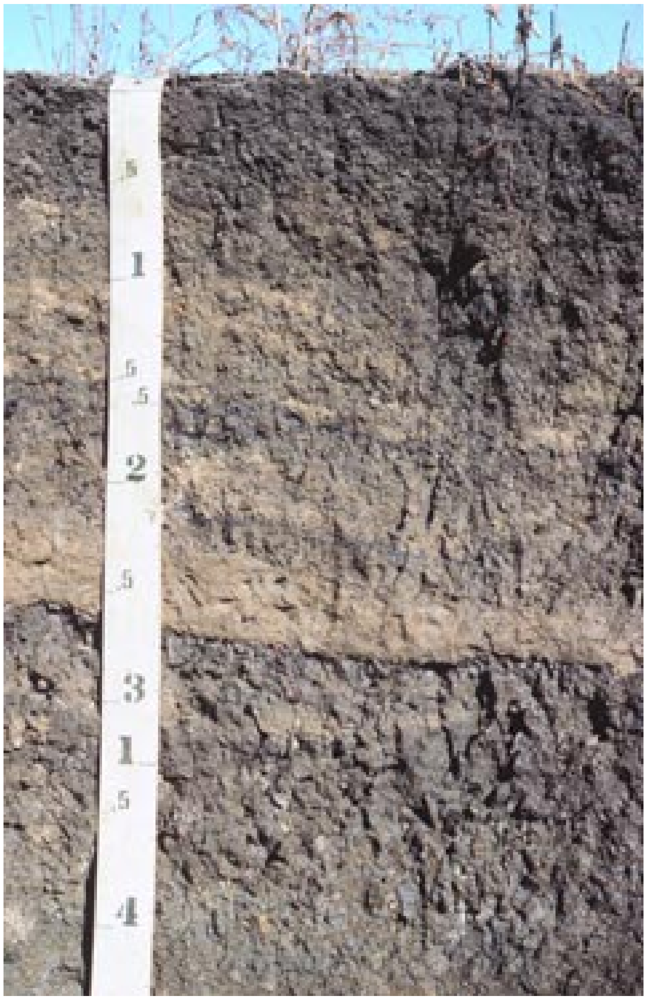

Figure 22.—A profile of Forney silty clay. The darker buried soil is at a depth of about 27 inches. Depth is marked in feet.

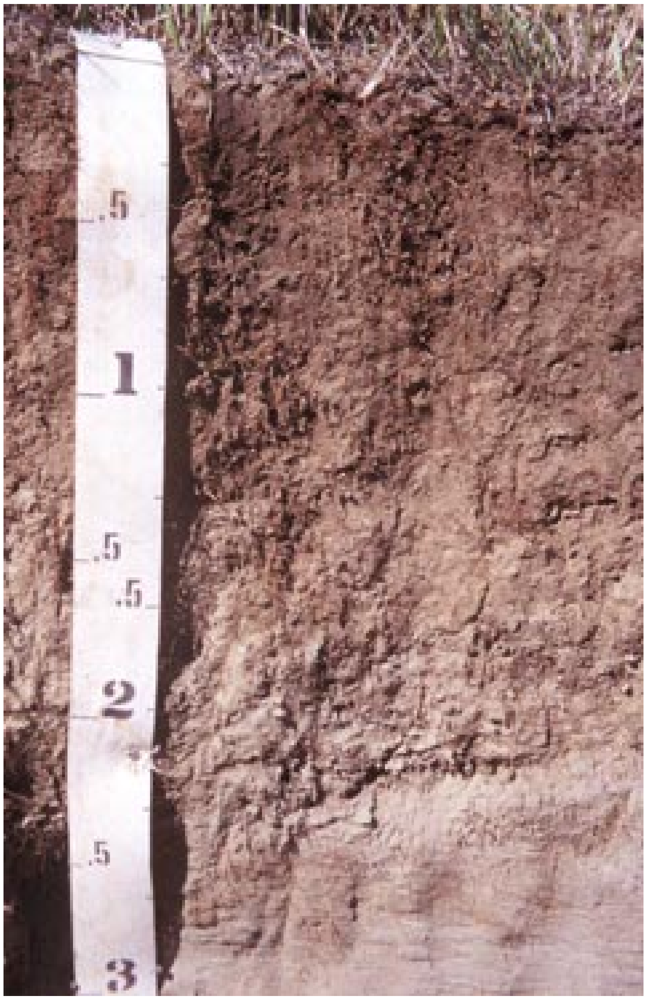

Figure 23.—A profile of Grable silt loam. A contrasting layer of fine sand is at a depth of about 29 inches. Depth is marked in feet.

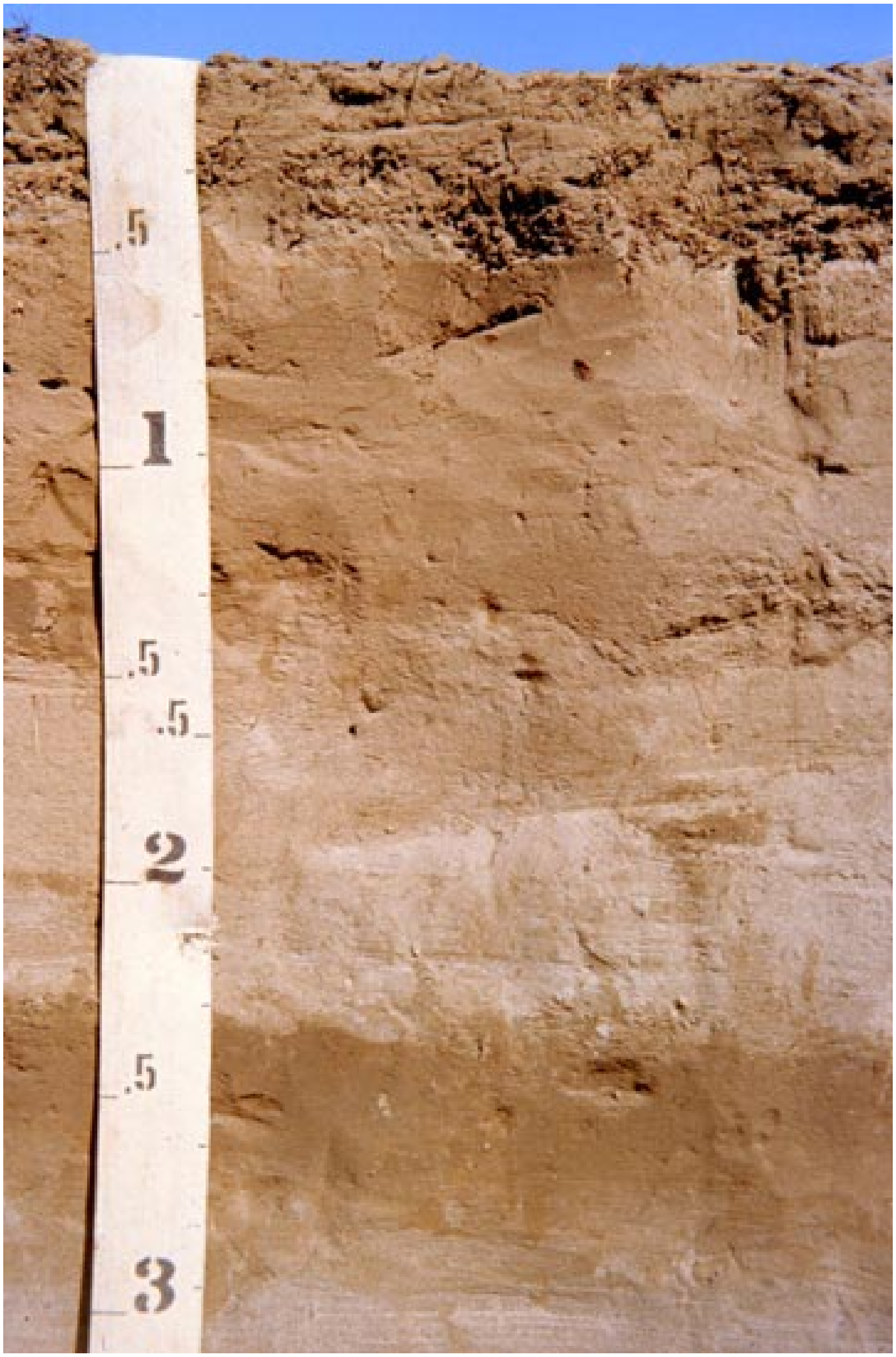

Figure 24.—A profile of Ticonic loamy fine sand. A contrasting stratified loamy layer is at a depth of about 26 inches. Depth is marked in feet.

A horizon:

Hue—10YR or 2.5Y
Value—3 to 5 (2 or 3 moist)
Chroma—1 or 2
Texture—dominantly silty clay loam; silt loam or loam in some pedons

Bk horizon:

Hue—10YR or 2.5Y
Value—4 or 5 (2 or 3 moist)
Chroma—1 or 2
Texture—dominantly silty clay loam or silt loam; loam, clay loam, or sandy clay loam in some pedons

Cg horizon:

Hue—10YR, 2.5Y, or 5Y
Value—5 to 7 (3 to 6 moist)
Chroma—1 or 2
Texture—stratified silt loam, silty clay loam, or silty clay

2C horizon (if it occurs):

Hue—7.5YR, 10YR, or 2.5Y
Value—4 to 7 (3 to 6 moist)
Chroma—1 to 3
Texture—dominantly fine sand or loamy fine sand; sand, loamy sand, gravelly sand, or gravelly loamy sand in some pedons

Lex Series

Depth to bedrock: Very deep
Drainage class: Somewhat poorly drained
Permeability: Moderate in the upper part and very rapid in the lower part
Landform: Flood plains
Parent material: Alluvium
Slope range: 0 to 2 percent

Typical Pedon

Lex clay loam, 0 to 2 percent slopes, 640 feet west and 160 feet north of the southeast corner of sec. 33, T. 95 N., R. 52 W.

Ap—0 to 7 inches; very dark gray (10YR 3/1) clay loam, black (10YR 2/1) moist; weak medium subangular blocky structure parting to weak fine granular; hard, friable, slightly sticky and slightly plastic; common very fine roots throughout; few fine and common very fine vesicular and tubular pores; strong effervescence; slightly alkaline; abrupt smooth boundary.

A—7 to 12 inches; very dark gray (10YR 3/1) clay loam, black (10YR 2/1) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine roots throughout; common very fine vesicular and tubular pores; strong effervescence; slightly alkaline; clear smooth boundary.

AC—12 to 20 inches; dark gray (10YR 4/1) and dark grayish brown (10YR 4/2) loam, very dark gray (10YR 3/1) and very dark grayish brown (10YR 3/2) moist; common fine distinct dark yellowish brown (10YR 4/6) redox concentrations; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine roots throughout; few fine and many very fine vesicular and tubular pores; few fine iron-manganese concretions; violent effervescence; moderately alkaline; gradual wavy boundary.

C1—20 to 32 inches; grayish brown (10YR 5/2) sandy loam, dark grayish brown (10YR 4/2) moist; common fine distinct dark yellowish brown (10YR 4/6) and dark brown (10YR 3/3) redox concentrations; massive; slightly hard, very friable, slightly sticky; few very fine roots throughout; few fine and many medium vesicular and tubular pores; common fine iron-manganese concretions; violent effervescence; moderately alkaline; clear smooth boundary.

2C2—32 to 45 inches; brown (10YR 5/3) gravelly loamy sand, brown (10YR 4/3) moist; many fine distinct dark yellowish brown (10YR 4/6) and common fine faint dark brown (10YR 3/3) redox concentrations; few fine prominent gray (2.5Y 5/1) redox depletions; single grain; loose; common fine and many very fine interstitial pores; common fine iron-manganese concretions; violent effervescence; moderately alkaline; clear smooth boundary.

2C3—45 to 52 inches; yellowish brown (10YR 5/4) gravelly sand, dark yellowish brown (10YR 4/4) moist; common fine prominent strong brown (7.5YR 4/6) redox concentrations and few fine prominent gray (2.5Y 5/1) redox depletions; single grain; loose; common fine and many very fine interstitial pores; common fine iron-manganese concretions; strong effervescence; moderately alkaline; clear wavy boundary.

2C4—52 to 80 inches; dark yellowish brown (10YR 4/4) gravelly sand, dark yellowish brown (10YR 3/4) moist; common fine and medium distinct dark brown (7.5YR 3/4) and common fine prominent strong brown (7.5YR 4/6) redox concentrations;

few fine prominent gray (2.5Y 5/1) redox depletions; single grain; loose; common fine and many very fine interstitial pores; common fine iron-manganese concretions; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 10 to 25 inches
Depth to carbonates: 0 to 8 inches
Depth to contrasting parent material: 20 to 40 inches over outwash sand and gravel
Depth to gypsum and other visible salts: More than 60 inches
Other features: Some pedons do not have a 2C2 horizon of gravelly loamy sand.

A horizon:
Hue—10YR, 2.5Y, or N
Value—3 to 5 (2 or 3 moist)
Chroma—0 to 2
Texture—dominantly clay loam; silt loam, loam, silty clay loam, or clay in some pedons

C horizon:
Hue—10YR or 2.5Y
Value—5 to 7 (4 to 6 moist)
Chroma—2 or 3
Texture—dominantly loam, silt loam, or fine sandy loam; clay loam, very fine sandy loam, or sandy loam in some pedons

2C horizon:
Hue—10YR or 2.5Y
Value—6 to 8 (5 to 7 moist)
Chroma—2 to 4
Texture—dominantly gravelly sand or coarse sand; fine sand or sand in some pedons

Lossing Series

Depth to bedrock: Very deep
Drainage class: Moderately well drained
Permeability: Slow
Landform: Flood plains
Parent material: Alluvium
Slope range: 0 to 2 percent

Typical Pedon

Lossing silty clay, 0 to 2 percent slopes, 1,800 feet south and 150 feet west of the northeast corner of sec. 18, T. 92 N., R. 52 W.

Ap—0 to 8 inches; dark grayish brown (2.5Y 4/2) silty clay, very dark grayish brown (2.5Y 3/2) moist; weak medium subangular blocky structure parting to moderate fine angular blocky; hard, friable, sticky and plastic; common fine roots throughout; few fine and very fine vesicular and tubular pores; neutral; abrupt smooth boundary.

Bg—8 to 13 inches; grayish brown (2.5Y 5/2) and dark grayish brown (2.5Y 4/2) silty clay, dark grayish brown (2.5Y 4/2) and very dark grayish brown (2.5Y 3/2) moist; few fine prominent yellowish brown (10YR 5/6) redox concentrations; weak medium subangular blocky structure; hard, friable, sticky and plastic; common fine roots between peds; few fine and common very fine vesicular and tubular pores; slight effervescence; slightly alkaline; clear smooth boundary.

Cg1—13 to 18 inches; grayish brown (2.5Y 5/2) silty clay loam with thin strata of silt loam and silt clay; dark grayish brown (2.5Y 4/2) moist; common fine prominent yellowish brown (10YR 5/6) redox concentrations; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine roots throughout; few fine and common very fine vesicular and tubular pores; strong effervescence; moderately alkaline; clear smooth boundary.

2Cg2—18 to 72 inches; light brownish gray (2.5Y 6/2) and grayish brown (2.5Y 5/2) silt loam with thin strata of very fine sandy loam, silty clay loam, and silty clay; grayish brown (2.5Y 5/2) and dark grayish brown (2.5Y 4/2) moist; many fine and common medium prominent yellowish brown (10YR 5/6) redox concentrations; weak thin platy structure resulting from layering of sediments; soft, very friable, slightly sticky; few fine and common very fine vesicular and tubular pores; violent effervescence; moderately alkaline; abrupt smooth boundary.

3Cg3—72 to 80 inches; olive gray (5Y 5/2) and gray (5Y 5/1) silty clay, olive gray (5Y 4/2) and dark gray (5Y 4/1) moist; many fine prominent yellowish brown (10YR 5/6) and few fine prominent strong brown (7.5YR 5/8) redox concentrations; massive; hard, firm, sticky and plastic; few fine and common very fine vesicular and tubular pores; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 5 to 9 inches
Depth to carbonates: 0 to 10 inches
Depth to contrasting parent material: 6 to 20 inches over loamy alluvium
Depth to gypsum and other visible salts: More than 60 inches
Other features: The drainage class in areas on the flood plain along the Missouri River is one class better than is typical for the series and is a result

of downcutting by the river. Some pedons do not have a 3Cg horizon of silty clay.

A horizon:
Hue—10YR or 2.5Y
Value—3 or 4 (2 or 3 moist)
Chroma—1 or 2
Texture—silty clay; fine sandy loam or very fine sandy loam overwash in some pedons

Bg horizon:
Hue—2.5Y
Value—4 or 5 (3 or 4 moist)
Chroma—2
Texture—silty clay or clay

Cg horizon:
Hue—2.5Y
Value—5 or 6 (4 or 5 moist)
Chroma—2 or 3
Texture—silty clay loam with thin strata of silt loam and silty clay

2Cg horizon:
Hue—2.5Y
Value—5 to 7 (4 to 6 moist)
Chroma—2
Texture—silt loam or very fine sandy loam with thin strata of silty clay loam and silty clay

3Cg horizon:
Hue—2.5Y or 5Y
Value—4 to 6 (3 to 5 moist)
Chroma—1 or 2
Texture—silty clay or silty clay loam

Luton Series

Depth to bedrock: Very deep
Drainage class: Poorly drained
Permeability: Very slow
Landform: Flood plains
Parent material: Alluvium
Slope range: 0 to 2 percent

Typical Pedon

Luton silty clay, 0 to 2 percent slopes, occasionally flooded, 2,240 feet north and 570 feet west of the southeast corner of sec. 1, T. 92 N., R. 52 W.

Ap—0 to 7 inches; very dark gray (10YR 3/1) silty clay, black (10YR 2/1) moist; moderate fine and medium subangular blocky structure; hard, firm, sticky and plastic; common very fine and few fine and medium roots throughout; common very fine vesicular and tubular pores; neutral; abrupt smooth boundary.

A—7 to 16 inches; very dark gray (10YR 3/1) silty clay, black (10YR 2/1) moist; moderate fine and medium subangular blocky structure; hard, firm, sticky and plastic; few very fine, fine, and medium roots throughout; common very fine vesicular and tubular pores; neutral; clear smooth boundary.

Bg—16 to 26 inches; very dark gray (N 3/0) silty clay, black (N 2.5/0) moist; moderate fine and medium subangular blocky structure; hard, firm, sticky and plastic; few very fine roots between peds; common very fine vesicular and tubular pores; neutral; clear smooth boundary.

Bssg1—26 to 33 inches; very dark gray (N 3/0) silty clay, black (N 2.5/0) moist; moderate medium subangular blocky structure; very hard, firm, sticky and plastic; few very fine roots between peds; common very fine vesicular and tubular pores; common distinct intersecting slickensides; slightly alkaline; clear wavy boundary.

Bssg2—33 to 58 inches; gray (5Y 5/1) silty clay, dark gray (5Y 4/1) moist; common fine prominent dark yellowish brown (10YR 4/6) redox concentrations; moderate medium blocky structure; very hard, firm, sticky and plastic; few very fine roots between peds; common prominent intersecting slickensides; common black (N 2.5/0) stains along root channels and cracks; common very fine vesicular and tubular pores; common fine carbonate concretions; slightly alkaline; abrupt smooth boundary.

Bkssg—58 to 80 inches; gray (5Y 5/1) silty clay, dark gray (5Y 4/1) moist; many fine prominent olive brown (2.5Y 4/4) redox concentrations; moderate medium blocky structure; very hard, firm, sticky and plastic; few very fine roots between peds; common very fine vesicular and tubular pores; many prominent intersecting slickensides; few fine iron-manganese concretions; common medium soft masses of carbonate; common fine carbonate concretions; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 20 to 40 inches
Depth to carbonates: 36 to 60 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: More than 60 inches
Other features: Some pedons have masses of gypsum and other salts below a depth of 40 inches.

A horizon:
Hue—10YR, 5Y, or N

Value—3 or 4 (2 or 3 moist)
Chroma—0 or 1
Texture—dominantly silty clay; clay or silty clay loam in some pedons

Bg and Bssg horizons:
Hue—5Y
Value—4 to 6 (3 to 5 moist)
Chroma—1 or 2
Texture—silty clay or clay

Bkssg horizon:
Hue—5Y
Value—5 or 6 (4 or 5 moist)
Chroma—1
Texture—silty clay or clay

Meckling Series

Depth to bedrock: Very deep
Drainage class: Moderately well drained
Permeability: Rapid
Landform: Flood plains
Parent material: Alluvium
Slope range: 0 to 4 percent

Typical Pedon

Meckling loamy fine sand, 0 to 4 percent slopes, 3,410 feet south and 2,630 feet east of the northwest corner of sec. 23, T. 32 N., R. 4 E.

Ap—0 to 6 inches; grayish brown (2.5Y 5/2) loamy fine sand, very dark grayish brown (2.5Y 3/2) moist; weak medium subangular blocky structure; soft, very friable; common fine and very fine roots throughout; common very fine vesicular pores; strong effervescence; slightly alkaline; abrupt smooth boundary.

C1—6 to 16 inches; light brownish gray (2.5Y 6/2) fine sand with thin strata of very fine sand, loamy very fine sand, and very fine sandy loam; dark grayish brown (2.5Y 4/2) moist; few fine distinct gray (2.5Y 5/1) redox depletions; common fine prominent strong brown (7.5YR 4/6) and common fine and medium prominent yellowish brown (10YR 5/6) redox concentrations; single grain; loose; few very fine roots throughout; common very fine interstitial pores; few fine iron-manganese concretions; many black (2.5Y 2.5/1) organic bands less than $^{1}/_{8}$ inch thick; strong effervescence; slightly alkaline; clear smooth boundary.

C2—16 to 37 inches; light brownish gray (2.5Y 6/2) very fine sand with thin strata of fine sand, loamy very fine sand, and very fine sandy loam; dark grayish brown (2.5Y 4/2) moist; few fine distinct gray (2.5Y 5/1) redox depletions; common fine prominent strong brown (7.5YR 4/6) and many fine and medium prominent yellowish brown (10YR 5/6) redox concentrations; single grain; loose; common very fine interstitial pores; few fine iron-manganese concretions; common black (2.5Y 2.5/1) organic bands less than $^{1}/_{8}$ inch thick; strong effervescence; slightly alkaline; clear smooth boundary.

C3—37 to 54 inches; light brownish gray (2.5Y 6/2) fine sand with thin strata of very fine sand, loamy very fine sand, and very fine sandy loam; dark grayish brown (2.5Y 4/2) moist; few fine distinct gray (2.5Y 5/1) redox depletions; few fine prominent strong brown (7.5YR 4/6) and common fine prominent yellowish brown (10YR 5/6) redox concentrations; single grain; loose; common very fine interstitial pores; few fine iron-manganese concretions; few black (2.5Y 2.5/1) organic bands less than $^{1}/_{8}$ inch thick; strong effervescence; slightly alkaline; abrupt smooth boundary.

C4—54 to 80 inches; light brownish gray (2.5Y 6/2), stratified sand to very fine sand, dark grayish brown (2.5Y 4/2) moist; common fine distinct gray (2.5Y 5/1) redox depletions and few fine prominent yellowish brown (10YR 5/6) redox concentrations; single grain; loose; many very fine interstitial pores; few fine iron-manganese concretions; slight effervescence; slightly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 0 to 9 inches
Carbonates: At the surface
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: More than 60 inches

A horizon:
Hue—10YR or 2.5Y
Value—3 to 5 (2 to 4 moist)
Chroma—1 to 3
Texture—loamy fine sand, loamy sand, fine sandy loam, very fine sandy loam, or sandy loam; very thin strata of silt loam, silty clay loam, or silty clay in some pedons

C horizon:
Hue—2.5Y
Value—5 or 6 (4 or 5 moist)
Chroma—2 or 3
Texture—dominantly stratified sand, very fine sand, fine sand, or loamy very fine sand; strata of very fine sandy loam, silt loam, silty clay loam, or silty clay in some pedons

Modale Series

Depth to bedrock: Very deep
Drainage class: Moderately well drained
Permeability: Moderate in the upper part and very slow in the lower part
Landform: Flood plains
Parent material: Alluvium
Slope range: 0 to 2 percent

Typical Pedon

Modale silt loam, 0 to 2 percent slopes, 2,435 feet west and 1,585 feet south of the northeast corner of sec. 23, T. 92 N., R. 52 W.

Ap—0 to 8 inches; dark grayish brown (2.5Y 4/2) silt loam, very dark grayish brown (2.5Y 3/2) moist; weak medium subangular blocky structure parting to weak fine granular; slightly hard, very friable, slightly sticky and slightly plastic; common fine and very fine roots throughout; few very fine vesicular and tubular pores; strong effervescence; moderately alkaline; abrupt smooth boundary.

C1—8 to 25 inches; light brownish gray (2.5Y 6/2) and grayish brown (2.5Y 5/2) silt loam with thin strata of very fine sandy loam and silty clay loam; grayish brown (2.5Y 5/2) and dark grayish brown (2.5Y 4/2) moist; common fine prominent yellowish brown (10YR 5/6) redox concentrations; massive; slightly hard, very friable, slightly sticky and slightly plastic; few fine and very fine roots throughout; few fine and common very fine vesicular and tubular pores; violent effervescence; moderately alkaline; abrupt smooth boundary.

2C2—25 to 70 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; common fine prominent yellowish brown (10YR 5/6) redox concentrations; massive; very hard, firm, sticky and plastic; few fine and common very fine vesicular and tubular pores; violent effervescence; moderately alkaline; abrupt smooth boundary.

3C3—70 to 80 inches; light brownish gray (2.5Y 6/2) and grayish brown (2.5Y 5/2) silty clay loam with thin strata of silt loam and silty clay; grayish brown (2.5Y 5/2) and dark grayish brown (2.5Y 4/2) moist; many fine and medium prominent yellowish brown (10YR 5/6) and few fine prominent strong brown (7.5YR 5/8) redox concentrations; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine and common very fine vesicular and tubular pores; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 6 to 10 inches
Depth to carbonates: 0 to 10 inches
Depth to contrasting parent material: 18 to 30 inches over clayey alluvium
Depth to gypsum and other visible salts: More than 60 inches
Other features: Some pedons do not have a 3C horizon of silty clay loam. This texture is not included in the engineering index properties table.

A horizon:
Hue—10YR or 2.5Y
Value—4 or 5 (3 moist)
Chroma—1 or 2
Texture—silt loam or very fine sandy loam

C horizon:
Hue—10YR or 2.5Y
Value—5 or 6 (4 or 5 moist)
Chroma—2 to 4
Texture—silt loam or very fine sandy loam with thin strata of silty clay loam and loamy very fine sand

2C horizon:
Hue—2.5Y or 5Y
Value—4 to 6 (3 to 5 moist)
Chroma—2
Texture—silty clay or clay

3C horizon:
Hue—2.5Y or 5Y
Value—4 to 6 (3 to 5 moist)
Chroma—2
Texture—silty clay loam with thin strata of silt loam and silty clay

Napa Series

Depth to bedrock: Very deep
Drainage class: Poorly drained
Permeability: Very slow
Landform: Flood plains
Parent material: Alluvium
Slope range: 0 to 2 percent

Typical Pedon

Napa silt loam, in an area of Napa-Luton complex, 0 to 2 percent slopes, 1,400 feet north and 105 feet east of the southwest corner of sec. 15, T. 93 N., R. 53 W.

E—0 to 0.5 inch; gray (10YR 6/1) silt loam, very dark gray (10YR 3/1) moist; weak thin platy structure;

hard, friable, slightly sticky and slightly plastic; many very fine and few fine roots throughout; few fine vesicular and tubular pores; slightly alkaline; abrupt smooth boundary.

Btnz1—0.5 inch to 7 inches; dark gray (2.5Y 4/1) silty clay, black (2.5Y 2.5/1) moist; weak coarse and moderate medium columnar structure parting to moderate medium subangular blocky; very hard, firm, sticky and plastic; many very fine and few fine roots throughout; common very fine vesicular and tubular pores; common tonguing of material from the E horizon on tops of columns; common fine nests of gypsum and common fine threads of salt; moderately alkaline; clear smooth boundary.

Btnz2—7 to 17 inches; dark gray (2.5Y 4/1) silty clay, black (2.5Y 2.5/1) moist; weak coarse subangular blocky structure parting to moderate medium subangular blocky; very hard, firm, sticky and plastic; common very fine roots throughout; common very fine vesicular and tubular pores; common fine and medium nests of gypsum and few fine threads of salt; moderately alkaline; clear smooth boundary.

Btnz3—17 to 26 inches; dark gray (5Y 4/1) and gray (5Y 5/1) silty clay, very dark gray (5Y 3/1) and black (5Y 2.5/1) moist; few fine prominent dark yellowish brown (10YR 4/6) redox concentrations; weak coarse subangular blocky structure parting to moderate medium subangular blocky; very hard, firm, sticky and plastic; few very fine roots throughout; common very fine vesicular and tubular pores; common fine and medium nests of gypsum and few fine threads of salt; slight effervescence; moderately alkaline; clear smooth boundary.

Btnz4—26 to 33 inches; gray (5Y 5/1) silty clay, very dark gray (5Y 3/1) moist; common fine prominent dark yellowish brown (10YR 4/6) redox concentrations; weak coarse subangular blocky structure parting to moderate medium subangular blocky; very hard, firm, sticky and plastic; few very fine roots throughout; common very fine vesicular and tubular pores; common fine and medium nests of gypsum and other salts; slight effervescence; moderately alkaline; abrupt smooth boundary.

Bkssz1—33 to 49 inches; gray (5Y 6/1) silty clay, dark gray (5Y 4/1) moist; many fine and common medium prominent dark yellowish brown (10YR 4/6) redox concentrations; weak medium subangular blocky structure; very hard, firm, sticky and plastic; few very fine roots between peds; common very fine vesicular and tubular pores; few black (N 2.5Y/0) streaks 1 to 3 mm thick; common or many prominent intersecting slickensides; few fine iron-manganese concretions; few fine and medium manganese concretions coated with hard masses of carbonate; common fine and medium soft masses of carbonate; common fine and medium nests of gypsum and other salts; strong effervescence; moderately alkaline; gradual wavy boundary.

Bkssz2—49 to 66 inches; gray (5Y 6/1) silty clay, dark gray (5Y 4/1) moist; many fine and medium prominent dark yellowish brown (10YR 4/6) redox concentrations; weak medium subangular blocky structure; very hard, firm, sticky and plastic; few very fine roots between peds; common very fine vesicular and tubular pores; common or many prominent intersecting slickensides; few fine and medium iron-manganese concretions; common fine soft masses of carbonate; common fine and medium nests of gypsum and other salts; strong effervescence; moderately alkaline; abrupt smooth boundary.

Ayssb—66 to 80 inches; dark gray (5Y 4/1) silty clay, very dark gray (5Y 3/1) moist; few fine prominent dark yellowish brown (10YR 4/4) redox concentrations; weak medium subangular blocky structure; very hard, firm, sticky and plastic; common very fine vesicular and tubular pores; few prominent nonintersecting slickensides; few fine carbonate concretions; common fine and medium nests of gypsum with coats of soft masses of carbonate; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 20 to 50 inches
Depth to carbonates: 5 to 45 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: 0 to 16 inches
Other features: Some pedons do not have a buried A horizon.

E horizon:
Hue—10YR or 2.5Y
Value—5 to 7 (3 or 4 moist)
Chroma—1
Texture—dominantly silt loam; silty clay loam or clay in some pedons

Btnz horizon:
Hue—10YR, 2.5Y, 5Y, or N
Value—3 or 4 (2 or 3 moist)
Chroma—0 or 1
Texture—silty clay or clay

Bkssz horizon:

Hue—10YR, 2.5Y, or 5Y
Value—5 to 7 (3 to 5 moist)
Chroma—1 to 3
Texture—dominantly silty clay or clay; silty clay loam in some pedons

Ab horizon:

Hue—10YR, 2.5Y, or 5Y
Value—5 to 7 (3 to 5 moist)
Chroma—1 to 3
Texture—dominantly silty clay or clay; silty clay loam in some pedons

Norway Series

Depth to bedrock: Very deep
Drainage class: Poorly drained and very poorly drained
Permeability: Rapid
Landform: Flood plains
Parent material: Alluvium
Slope range: 0 to 4 percent

Typical Pedon

Norway loamy fine sand, in an area of Norway-Meckling loamy fine sands, 0 to 4 percent slopes, 5,060 feet south and 2,630 feet east of the northwest corner of sec. 23, T. 32 N., R. 4 E.

A—0 to 2 inches; grayish brown (2.5Y 5/2), stratified loamy fine sand, very dark grayish brown (2.5Y 3/2) moist; common fine and medium prominent dark yellowish brown (10YR 4/6) and common fine prominent strong brown (7.5YR 5/8) redox concentrations; few fine distinct gray (2.5Y 5/1) redox depletions; common prominent yellowish red (5YR 4/6) oxidized concentrations along root channels; weak medium subangular blocky structure parting to weak fine granular; soft, very friable; common medium and many fine and very fine roots throughout; common fine and many very fine interstitial pores; few fine iron-manganese concretions; strong effervescence; slightly alkaline; clear smooth boundary.

C—2 to 10 inches; light brownish gray (2.5Y 6/2), stratified fine sand and very fine sand, dark grayish brown (2.5Y 4/2) moist; common fine prominent dark yellowish brown (10YR 4/6) and few fine prominent strong brown (7.5YR 5/8) redox concentrations; single grain; loose; few medium and common fine and very fine roots throughout; common fine and many very fine interstitial pores; few fine iron-manganese concretions; slight effervescence; slightly alkaline; clear smooth boundary.

Cg—10 to 80 inches; light olive gray (5Y 6/2), stratified fine sand and very fine sand, olive gray (5Y 4/2) moist; few fine prominent dark yellowish brown (10YR 4/6) and strong brown (7.5YR 5/8) redox concentrations; single grain; loose; few fine and very fine roots throughout; common fine and many very fine interstitial pores; few fine iron-manganese concretions; slight effervescence; slightly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 0 to 4 inches
Carbonates: At the surface
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: More than 60 inches
Other features: Some pedons have an O horizon. Some pedons are not stratified. Some pedons are on islands in the Missouri River that are frequently flooded.

A horizon:

Hue—10YR to 5Y
Value—3 to 5 (2 to 4 moist)
Chroma—1 or 2
Texture—loamy fine sand, fine sand, loamy sand, or very fine sand; strata of very fine sandy loam, silt loam, silty clay loam, or silty clay in most pedons

C or Cg horizon:

Hue—2.5Y or 5Y
Value—5 or 6 (4 or 5 moist)
Chroma—1 or 2
Texture—dominantly stratified fine sand to loamy very fine sand; strata of very fine sandy loam, silt loam, silty clay loam, or silty clay in some pedons

Onawa Series

Depth to bedrock: Very deep
Drainage class: Moderately well drained
Permeability: Slow
Landform: Flood plains
Parent material: Alluvium
Slope range: 0 to 2 percent

Typical Pedon

Onawa silty clay, 0 to 2 percent slopes, 1,470 feet west and 180 feet south of the northeast corner of sec. 20, T. 92 N., R. 53 W.

Ap—0 to 7 inches; dark grayish brown (2.5Y 4/2) silty clay, very dark grayish brown (2.5Y 3/2) moist; moderate medium subangular blocky structure parting to moderate fine and very fine angular blocky; very hard, firm, sticky and plastic; few fine and very fine roots; few fine and very fine vesicular and tubular pores; slight effervescence; slightly alkaline; abrupt smooth boundary.

Cg1—7 to 25 inches; grayish brown (2.5Y 5/2) and dark grayish brown (2.5Y 4/2) silty clay, dark grayish brown (2.5Y 4/2) and very dark grayish brown (2.5Y 3/2) moist; few fine prominent yellowish brown (10YR 5/6) redox concentrations; weak medium subangular blocky structure; very hard, firm, sticky and plastic; few very fine roots throughout; few fine and common very fine vesicular and tubular pores; strong effervescence; moderately alkaline; abrupt smooth boundary.

2Cg2—25 to 47 inches; light brownish gray (2.5Y 6/2) silt loam with thin strata of very fine sandy loam and silty clay loam; grayish brown (2.5Y 5/2) moist; common fine and few medium prominent yellowish brown (10YR 5/6) redox concentrations and few fine distinct dark gray (2.5Y 4/1) redox depletions; massive; slightly hard, very friable, slightly sticky; few very fine roots throughout; few fine and common very fine vesicular and tubular pores; strong effervescence; moderately alkaline; clear smooth boundary.

2Cg3—47 to 70 inches; light brownish gray (2.5Y 6/2) very fine sandy loam with thin strata of silt loam and silty clay loam; grayish brown (2.5Y 5/2) moist; common fine and few medium prominent yellowish brown (10YR 5/6) redox concentrations and common fine distinct dark gray (2.5Y 4/1) redox depletions; massive; soft, very friable; few very fine roots in the upper part; few fine and common very fine vesicular and tubular pores; strong effervescence; moderately alkaline; abrupt smooth boundary.

2Cg4—70 to 80 inches; light brownish gray (2.5Y 6/2) loamy very fine sand with thin strata of very fine sandy loam and silt loam; grayish brown (2.5Y 5/2) moist; common fine prominent yellowish brown (10YR 5/6) redox concentrations and common fine distinct gray (2.5Y 5/1) redox depletions; massive; soft, very friable; few fine and very fine vesicular and tubular pores; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 6 to 10 inches
Depth to carbonates: 0 to 10 inches
Depth to contrasting parent material: 18 to 30 inches over loamy alluvium
Depth to gypsum and other visible salts: More than 60 inches
Other features: The drainage class in areas on the flood plain along the Missouri River is one class better than is typical for the series and is a result of downcutting by the river.

A horizon:
Hue—10YR or 2.5Y
Value—3 or 4 (2 or 3 moist)
Chroma—1 or 2
Texture—silty clay, silty clay loam, loam, or silt loam; very fine sandy loam or fine sandy loam overwash in some pedons

Cg horizon:
Hue—2.5Y, 5Y, or N
Value—4 to 6 (3 to 5 moist)
Chroma—0 to 2
Texture—silty clay or clay

2Cg horizon:
Hue—2.5Y or 5Y
Value—4 to 6 (3 to 5 moist)
Chroma—2
Texture—dominantly silt loam, very fine sandy loam, or loamy very fine sand with thin strata of silty clay loam; loam in some pedons

Owego Series

Depth to bedrock: Very deep
Drainage class: Somewhat poorly drained
Permeability: Very slow
Landform: Flood plains
Parent material: Alluvium
Slope range: 0 to 2 percent

Typical Pedon

Owego silty clay, 0 to 2 percent slopes, 2,040 feet south and 1,190 feet east of the northwest corner of sec. 14, T. 92 N., R. 53 W.

Ap—0 to 9 inches; dark grayish brown (2.5Y 4/2) silty clay, very dark grayish brown (2.5Y 3/2) moist; moderate fine and medium subangular blocky structure parting to moderate fine angular blocky; hard, firm, sticky and plastic; common fine and very fine roots throughout; few fine and very fine vesicular and tubular pores; neutral; abrupt smooth boundary.

Cg1—9 to 16 inches; olive gray (5Y 5/2) silty clay, olive gray (5Y 4/2) moist; few fine prominent yellowish brown (10YR 5/4) redox concentrations; massive; very hard, firm, sticky and plastic; few fine and very fine roots throughout; few fine and common very fine vesicular and tubular pores; slight effervescence in the lower part; slightly alkaline; abrupt smooth boundary.

Cg2—16 to 24 inches; light olive gray (5Y 6/2) and pale olive (5Y 6/3) silt loam with thin strata of silty clay loam and silty clay; olive gray (5Y 5/2) and olive (5Y 5/3) moist; many fine and common medium prominent yellowish brown (10YR 5/6) redox concentrations; massive; hard, friable, slightly sticky and slightly plastic; few very fine roots throughout; few fine and common very fine vesicular and tubular pores; strong effervescence; moderately alkaline; abrupt smooth boundary.

Cg3—24 to 68 inches; silty clay, dark gray (N 4/0) in the upper part grading to light olive gray (5Y 6/2), very dark gray (N 3/0) grading to olive gray (5Y 4/2) moist; many fine and medium prominent yellowish brown (10YR 5/6) and few fine prominent strong brown (7.5YR 5/8) redox concentrations; common fine and few medium distinct gray (5Y 5/1) redox depletions; massive; very hard, firm, sticky and plastic; few very fine roots between peds in the upper part; few fine and many very fine vesicular and tubular pores; strong effervescence; moderately alkaline; abrupt smooth boundary.

Cg4—68 to 80 inches; light olive gray (5Y 6/2) silt loam with thin strata of silty clay loam and silty clay; olive gray (5Y 4/2) moist; few prominent dark gray (5Y 4/1) strata of silty clay loam $^1/_4$ to $^1/_2$ inch thick; many fine and common medium prominent yellowish brown (10YR 5/6) and few fine and medium prominent strong brown (7.5YR 5/8) redox concentrations; common fine and few medium distinct gray (5Y 5/1) redox depletions; massive; hard, friable, slightly sticky and slightly plastic; few fine and many very fine vesicular and tubular pores; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 6 to 9 inches
Depth to carbonates: 12 to 24 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: More than 60 inches
Other features: The drainage class in areas on the flood plain along the Missouri River is one class better than is typical for the series and is a result of downcutting by the river. Some pedons do not have a Cg4 horizon of silt loam. This horizon is not included in the engineering index properties table.

A horizon:
Hue—10YR or 2.5Y
Value—4 (3 moist)
Chroma—1 or 2
Texture—silty clay

Cg1 horizon:
Hue—2.5Y or 5Y
Value—5 (4 moist)
Chroma—1 or 2
Texture—silty clay

Cg2 horizon:
Hue—2.5Y or 5Y
Value—5 to 7 (4 to 6 moist)
Chroma—1 to 3
Texture—dominantly silt loam or silty clay loam; clay loam or loam in some pedons

Cg3 horizon:
Hue—5Y or N
Value—4 to 6 (3 to 5 moist)
Chroma—0 to 2
Texture—dominantly silty clay; clay or silty clay loam in some pedons

Cg4 horizon:
Hue—2.5Y or 5Y
Value—5 to 7 (4 to 6 moist)
Chroma—2 or 3
Texture—dominantly silt loam or very fine sandy loam with thin strata of silty clay loam and silty clay; loamy very fine sand in some pedons

Percival Series

Depth to bedrock: Very deep
Drainage class: Moderately well drained
Permeability: Slow
Landform: Flood plains
Parent material: Alluvium
Slope range: 0 to 6 percent

Typical Pedon

Percival silty clay, 0 to 2 percent slopes, 2,080 feet east and 1,770 feet south of the northwest corner of sec. 20, T. 92 N., R. 52 W.

Ap—0 to 7 inches; dark grayish brown (2.5Y 4/2) silty clay, very dark grayish brown (2.5Y 3/2) moist; moderate medium subangular blocky structure parting to moderate fine angular blocky; very hard, firm, sticky and plastic; few fine and very fine roots throughout; few very fine vesicular and tubular pores; slight effervescence; slightly alkaline; abrupt smooth boundary.

Cg—7 to 25 inches; grayish brown (2.5Y 5/2) and dark grayish brown (2.5Y 4/2) silty clay, dark grayish brown (2.5Y 4/2) and very dark grayish brown (2.5Y 3/2) moist; few fine prominent dark yellowish brown (10YR 4/4) redox concentrations; weak fine and very fine angular blocky structure; very hard, firm, sticky and plastic; few fine and very fine roots throughout; few fine and common very fine vesicular and tubular pores; strong effervescence; moderately alkaline; abrupt smooth boundary.

2C1—25 to 58 inches; light brownish gray (2.5Y 6/2), stratified fine sand and loamy fine sand, grayish brown (2.5Y 5/2) moist; few fine prominent yellowish brown (10YR 5/6) redox concentrations; single grain; loose; few fine roots in the upper part; many very fine interstitial pores; slight effervescence; slightly alkaline; clear smooth boundary.

2C2—58 to 74 inches; grayish brown (2.5Y 5/2), stratified loamy fine sand and fine sand, dark grayish brown (2.5Y 4/2) moist; few fine prominent dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/6) redox concentrations; single grain; loose; many very fine interstitial pores; slight effervescence; slightly alkaline; abrupt smooth boundary.

3C3—74 to 80 inches; grayish brown (2.5Y 5/2) silt loam with thin strata of very fine sandy loam and silty clay loam; dark grayish brown (2.5Y 4/2) moist; common fine prominent yellowish brown (10YR 5/6) and few fine prominent strong brown (7.5YR 5/8) redox concentrations; massive; slightly hard, very friable, slightly sticky; common very fine vesicular and tubular pores; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 6 to 9 inches
Depth to carbonates: 0 to 9 inches
Depth to contrasting parent material: 15 to 30 inches over sandy alluvium
Depth to gypsum and other visible salts: More than 60 inches
Other features: The drainage class in areas on the flood plain along the Missouri River is one class better than is typical for the series and is a result of downcutting by the river. Some pedons do not have a stratified 3C horizon of silt loam or very fine sandy loam. This horizon is not included in the engineering index properties table.

A horizon:
Hue—10YR or 2.5Y
Value—4 (3 moist)
Chroma—1 or 2
Texture—dominantly silty clay; clay or silty clay loam in some pedons

Cg horizon:
Hue—2.5Y or 5Y
Value—5 or 6 (4 or 5 moist)
Chroma—1 or 2
Texture—silty clay or clay

2C horizon:
Hue—2.5Y
Value—5 to 7 (4 to 6 moist)
Chroma—2
Texture—stratified fine sand and loamy fine sand

3C horizon:
Hue—2.5Y
Value—5 to 7 (4 to 6 moist)
Chroma—2
Texture—silt loam with thin strata of very fine sandy loam and silty clay loam

Roxbury Series

Depth to bedrock: Very deep
Drainage class: Moderately well drained
Permeability: Moderate
Landform: Flood plains
Parent material: Alluvium
Slope range: 0 to 2 percent

Typical Pedon

Roxbury silt loam, 2,490 feet south and 210 feet east of the northwest corner of sec. 15, T. 94 N., R. 54 W., in Yankton County:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; weak fine granular structure; soft, very friable; few fine and common very fine roots throughout; common very fine tubular pores; strong effervescence; neutral; abrupt smooth boundary.

A1—8 to 12 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure; slightly hard, very friable; few fine and common very fine roots throughout; few fine and common very fine tubular pores; strong effervescence; slightly alkaline; gradual smooth boundary.

A2—12 to 24 inches; grayish brown (10YR 5/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure;

slightly hard, very friable, slightly sticky and slightly plastic; few fine and very fine roots throughout; few fine and many very fine tubular pores; strong effervescence; slightly alkaline; clear smooth boundary.

C—24 to 42 inches; grayish brown (10YR 5/2) and very pale brown (10YR 7/3) silty clay loam, dark grayish brown (10YR 4/2) and brown (10YR 5/3) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots throughout; few fine and many very fine vesicular and tubular pores; thin strata of contrasting color and texture; strong effervescence; slightly alkaline; abrupt smooth boundary.

Ab—42 to 60 inches; dark gray (10YR 4/1) silty clay loam, black (10YR 2/1) moist; weak medium subangular blocky structure; hard, friable, sticky and plastic; few fine and many very fine vesicular and tubular pores; slight effervescence; slightly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 20 to more than 60 inches

Depth to carbonates: 0 to 15 inches

Depth to contrasting parent material: 40 to more than 60 inches over clayey or sandy alluvium

Depth to gypsum and other visible salts: More than 60 inches

A horizon:

Hue—10YR

Value—4 or 5 (2 or 3 moist)

Chroma—1 or 2

Texture—dominantly silt loam; loam or silty clay loam in some pedons

C horizon:

Hue—7.5YR, 10YR, or 2.5Y

Value—5 to 7 (4 or 5 moist)

Chroma—2 or 3

Texture—loam, silt loam, or silty clay loam

Salix Series

Depth to bedrock: Very deep

Drainage class: Moderately well drained

Permeability: Moderate

Landform: Flood plains

Parent material: Alluvium

Slope range: 0 to 2 percent

Typical Pedon

Salix silty clay loam, 0 to 2 percent slopes, 2,540 feet north and 1,595 feet west of the southeast corner of sec. 26, T. 92 N., R. 51 W.

Ap—0 to 6 inches; dark gray (10YR 4/1) silty clay loam, very dark gray (10YR 3/1) moist; weak medium subangular blocky structure parting to weak fine granular; hard, firm, slightly sticky and slightly plastic; common fine and very fine roots throughout; common very fine vesicular and tubular pores; slightly acid; abrupt smooth boundary.

A—6 to 15 inches; dark gray (10YR 4/1) silty clay loam, very dark gray (10YR 3/1) moist; weak medium subangular blocky structure parting to weak fine granular; hard, firm, slightly sticky and slightly plastic; few fine and common very fine roots throughout; common very fine vesicular and tubular pores; neutral; clear smooth boundary.

Bw—15 to 24 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine and very fine roots throughout; common very fine vesicular and tubular pores; neutral; gradual smooth boundary.

BC—24 to 34 inches; light brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; few fine distinct dark yellowish brown (10YR 4/4) redox concentrations; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine and very fine roots throughout; few fine and common very fine vesicular and tubular pores; strong effervescence; slightly alkaline; gradual wavy boundary.

C1—34 to 52 inches; grayish brown (2.5Y 5/2) silt loam, dark grayish brown (2.5Y 4/2) moist; common fine prominent dark yellowish brown (10YR 4/4) redox concentrations; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine and very fine roots throughout; few fine and common very fine vesicular and tubular pores; common fine and medium carbonate concretions; strong effervescence; moderately alkaline; clear smooth boundary.

C2—52 to 67 inches; light brownish gray (2.5Y 6/2) very fine sandy loam, dark grayish brown (2.5Y 4/2) moist; many fine and medium faint grayish brown (2.5Y 5/2) redox depletions; common fine and medium prominent dark yellowish brown (10YR 4/4) and few fine prominent dark yellowish brown (10YR 4/6) redox concentrations; massive; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots throughout; few fine and many very fine vesicular and tubular pores; strong effervescence; moderately alkaline; clear smooth boundary.

C3—67 to 75 inches; grayish brown (2.5Y 5/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; few fine and medium prominent dark yellowish brown (10YR 3/4) and few fine prominent dark yellowish brown (10YR 4/6) redox concentrations; massive; slightly hard, very friable; slight effervescence; moderately alkaline; clear smooth boundary.

2C4—75 to 80 inches; light brownish gray (2.5Y 6/2) fine sand, dark grayish brown (2.5Y 4/2) moist; single grain; loose; common very fine interstitial pores; slight effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 14 to 30 inches
Depth to carbonates: 24 to 40 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: More than 60 inches
Other features: Some pedons do not have fine sandy loam and fine sand below a depth of 60 inches. These textures are not included in the engineering index properties table.

A horizon:
Hue—10YR
Value—3 or 4 (2 or 3 moist)
Chroma—1 or 2
Texture—silty clay loam or silt loam

Bw horizon:
Hue—10YR
Value—4 or 5 (3 or 4 moist)
Chroma—2 or 3
Texture—silty clay loam

C horizon:
Hue—10YR or 2.5Y
Value—5 or 6 (4 or 5 moist)
Chroma—2 or 3
Texture—dominantly silt loam or very fine sandy loam; loam, fine sandy loam, or fine sand in some pedons

Salmo Series

Depth to bedrock: Very deep
Drainage class: Poorly drained
Permeability: Moderately slow
Landform: Flood plains
Parent material: Alluvium
Slope range: 0 to 1 percent

Typical Pedon

Salmo silty clay loam, 0 to 1 percent slopes, 1,540 feet north and 180 feet west of the southeast corner of sec. 3, T. 95 N., R. 53 W.

Az—0 to 6 inches; very dark gray (10YR 3/1) silty clay loam, black (10YR 2/1) moist; common fine prominent strong brown (7.5YR 4/6) redox concentrations; weak medium subangular blocky structure parting to weak fine granular; hard, friable, slightly sticky and slightly plastic; many fine and very fine roots throughout; common very fine tubular pores; many fine and common medium salt masses; strong effervescence; moderately alkaline; clear smooth boundary.

Byz1—6 to 14 inches; very dark gray (N 3/0) silty clay loam, black (N 2.5/0) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine and very fine roots throughout; common very fine tubular pores; common fine salt masses; common fine masses of gypsum; slight effervescence; moderately alkaline; clear wavy boundary.

Byz2—14 to 24 inches; very dark gray (N 3/0) silty clay loam, black (N 2.5/0) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine and very fine roots throughout; common very fine tubular pores; few fine salt masses; common fine and few medium masses of gypsum; slight effervescence; slightly alkaline; gradual wavy boundary.

Byg1—24 to 35 inches; dark gray (5Y 4/1) silty clay loam, very dark gray (5Y 3/1) moist; few fine prominent yellowish brown (10YR 5/6) redox concentrations; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine and common very fine tubular pores; common fine and few medium masses of gypsum; slight effervescence; slightly alkaline; gradual wavy boundary.

Byg2—35 to 41 inches; dark gray (5Y 4/1) silty clay loam, very dark gray (5Y 3/1) moist; common fine prominent yellowish brown (10YR 5/6) redox concentrations; weak coarse prismatic structure parting to weak medium subangular blocky; hard, friable, slightly sticky and slightly plastic; few fine and common very fine vesicular and tubular pores; common fine and medium masses of gypsum; slight effervescence; slightly alkaline; clear wavy boundary.

Byg3—41 to 47 inches; light olive gray (5Y 6/2) silty clay loam, olive gray (5Y 4/2) moist; many fine and common medium prominent yellowish brown (10YR 5/6) redox concentrations; weak coarse prismatic structure parting to weak medium subangular blocky; hard, friable, slightly sticky and slightly plastic; few fine and many very fine vesicular and tubular pores; common fine and medium masses of gypsum; slight effervescence; slightly alkaline; clear wavy boundary.

Bkg—47 to 53 inches; light olive gray (5Y 6/2) silty clay loam, olive gray (5Y 4/2) moist; many fine and medium prominent yellowish brown (10YR 5/6) and few fine prominent strong brown (7.5YR 5/8) redox concentrations; weak coarse prismatic structure parting to weak medium subangular blocky; hard, friable, slightly sticky and slightly plastic; few fine and many very fine vesicular and tubular pores; few fine and medium soft masses of carbonate; strong effervescence; slightly alkaline; gradual wavy boundary.

Cg—53 to 80 inches; light gray (5Y 7/1) clay loam, gray (5Y 5/1) moist; many medium and coarse prominent yellowish brown (10YR 5/6) and common fine prominent strong brown (7.5YR 5/8) redox concentrations; massive; very hard, firm, slightly sticky and slightly plastic; few fine and many very fine vesicular and tubular pores; violent effervescence; slightly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 24 to 45 inches
Carbonates: At the surface
Depth to contrasting parent material: 40 to more than 60 inches over gravelly alluvium
Gypsum and other visible salts: At the surface

A horizon:
Hue—10YR, 5Y, or N
Value—3 or 4 (2 or 3 moist)
Chroma—0 or 1
Texture—silty clay loam or silt loam

Byz, Byg, and Bkg horizons:
Hue—10YR, 2.5Y, 5Y, or N
Value—3 to 6 (2 to 4 moist)
Chroma—0 to 2
Texture—silt loam or silty clay loam

Cg horizon:
Hue—2.5Y, 5Y, or N
Value—3 to 7 (2 to 5 moist)
Chroma—0 to 2
Texture—clay loam, silt loam, or silty clay loam

Sardak Series

Depth to bedrock: Very deep
Drainage class: Excessively drained
Permeability: Rapid
Landform: Flood plains
Parent material: Alluvium
Slope range: 0 to 9 percent

Typical Pedon

Sardak loamy fine sand, in an area of Sardak-Scroll complex, 0 to 6 percent slopes, 1,020 feet north and 760 feet west of the southeast corner of sec. 24, T. 92 N., R. 52 W.

Ap—0 to 6 inches; grayish brown (2.5Y 5/2) loamy fine sand, very dark grayish brown (2.5Y 3/2) moist; weak medium subangular blocky structure parting to weak fine granular; slightly hard, very friable; many fine and very fine roots throughout; common very fine vesicular and tubular pores; slight effervescence; neutral; abrupt smooth boundary.

C1—6 to 10 inches; light brownish gray (2.5Y 6/2) loamy fine sand, dark grayish brown (2.5Y 4/2) moist; massive; soft, very friable; common fine and very fine roots throughout; few fine and common very fine vesicular and tubular pores; slight effervescence; slightly alkaline; clear smooth boundary.

C2—10 to 80 inches; light brownish gray (2.5Y 6/2) fine sand, grayish brown (2.5Y 5/2) moist; single grain; loose; few fine roots throughout the upper part; many very fine interstitial pores; slight effervescence; slightly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 0 to 9 inches
Depth to carbonates: 0 to 40 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: More than 60 inches

A horizon:
Hue—10YR or 2.5Y
Value—4 to 6 (3 to 5 moist)
Chroma—1 to 3
Texture—dominantly loamy fine sand; sand, loamy sand, fine sand, or fine sandy loam in some pedons

C horizon:
Hue—10YR or 2.5Y
Value—5 to 7 (4 to 6 moist)
Chroma—2 to 4
Texture—dominantly loamy fine sand and fine sand; sand or loamy sand in some pedons

Scroll Series

Depth to bedrock: Very deep
Drainage class: Moderately well drained
Permeability: Slow in the upper part and rapid in the lower part
Landform: Flood plains
Parent material: Alluvium
Slope range: 0 to 6 percent

Typical Pedon

Scroll silty clay, in an area of Sardak-Scroll complex, 0 to 6 percent slopes, 1,600 feet south and 1,100 feet west of the northeast corner of sec. 25, T. 92 N., R. 52 W.

Ap—0 to 8 inches; dark grayish brown (2.5Y 4/2) silty clay, very dark grayish brown (2.5Y 3/2) moist; weak medium subangular blocky structure parting to moderate fine angular blocky; hard, firm, sticky and plastic; many fine and very fine roots throughout; few fine and common very fine vesicular and tubular pores; strong effervescence; moderately alkaline; abrupt smooth boundary.

C1—8 to 11 inches; grayish brown (2.5Y 5/2) silt loam with thin strata of silty clay loam and silty clay; dark grayish brown (2.5Y 4/2) moist; few fine prominent yellowish brown (10YR 5/6) redox concentrations; massive; slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine roots throughout; few fine and common very fine vesicular and tubular pores; strong effervescence; moderately alkaline; abrupt smooth boundary.

2C2—11 to 80 inches; light brownish gray (2.5Y 6/2) fine sand, grayish brown (2.5Y 5/2) moist; common fine prominent yellowish brown (10YR 5/6) redox concentrations; single grain; loose; many very fine interstitial pores; slight effervescence; slightly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 0 to 9 inches
Depth to carbonates: 0 to 5 inches
Depth to contrasting parent material: 11 to 15 inches over sandy alluvium
Depth to gypsum and other visible salts: More than 60 inches
Other features: The drainage class in areas on the flood plain along the Missouri River is one class better than is typical for the series and is a result of downcutting by the river.

A horizon:
Hue—10YR, 2.5Y, or 5Y
Value—4 or 5 (3 or 4 moist)
Chroma—1 or 2
Texture—silty clay or silty clay loam

C horizon:
Hue—2.5Y or 5Y
Value—5 or 6 (4 or 5 moist)
Chroma—2
Texture—silt loam with thin strata of silty clay loam and silty clay

2C horizon:
Hue—2.5Y
Value—5 to 7 (4 to 6 moist)
Chroma—2
Texture—loamy fine sand, fine sand, or sand

Storla Series

Depth to bedrock: Very deep
Drainage class: Moderately well drained
Permeability: Moderate in the upper part and rapid in the lower part
Landform: Outwash plains
Parent material: Glacial outwash
Slope range: 0 to 2 percent

Typical Pedon

Storla loam, in an area of Enet-Storla-Tetonka complex, 0 to 6 percent slopes, 235 feet north and 80 feet west of the southeast corner of sec. 14, T. 95 N., R. 53 W.

Ap—0 to 9 inches; very dark gray (10YR 3/1) loam, black (10YR 2/1) moist; weak medium subangular blocky structure parting to moderate fine and medium granular; slightly hard, very friable, slightly sticky and slightly plastic; many very fine roots throughout; many very fine tubular pores; strong effervescence; slightly alkaline; abrupt smooth boundary.

Bk1—9 to 13 inches; dark gray (10YR 4/1) loam, very dark gray (10YR 3/1) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky; many very fine roots throughout; many very fine tubular pores; many fine soft masses of carbonate; violent effervescence; moderately alkaline; clear smooth boundary.

Bk2—13 to 25 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; common fine distinct dark yellowish brown (10YR 4/6) redox concentrations; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky; many very fine roots throughout; many very fine tubular pores; many fine soft masses of carbonate; violent effervescence; moderately alkaline; abrupt smooth boundary.

2C1—25 to 44 inches; pale brown (10YR 6/3) gravelly loamy sand, brown (10YR 4/3) moist; common fine distinct dark yellowish brown (10YR 4/6) redox concentrations; single grain; loose; few fine roots throughout; few fine and many very fine interstitial pores; few fine iron-manganese concretions; about 20 percent gravel; violent effervescence; moderately alkaline; clear smooth boundary.

2C2—44 to 56 inches; brown (7.5YR 5/4) gravelly sand, strong brown (7.5YR 4/6) moist; many fine prominent dark yellowish brown (10YR 4/6) and many fine distinct strong brown (7.5YR 5/8) redox concentrations; single grain; loose; common fine and many very fine interstitial pores; common fine iron-manganese concretions; about 25 percent gravel; violent effervescence; moderately alkaline; clear wavy boundary.

2C3—56 to 80 inches; light brownish gray (2.5Y 6/2) gravelly loamy sand, light olive brown (2.5Y 5/3) moist; few fine prominent strong brown (7.5YR 5/8) and common fine distinct light olive brown (2.5Y 5/4) redox concentrations, common fine prominent light olive gray (5Y 6/2) redox depletions; single grain; loose; common fine and very fine interstitial pores; common fine iron-manganese concretions; many medium and coarse carbonate concretions; about 20 percent gravel; violent effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 7 to 15 inches
Depth to carbonates: 0 to 6 inches
Depth to contrasting parent material: 20 to 36 inches over outwash sand and gravel
Depth to gypsum and other visible salts: 15 to more than 60 inches
Other features: Some pedons have clay loam glacial till below a depth of 60 inches.

A horizon:
Hue—10YR or 2.5Y
Value—3 or 4 (2 or 3 moist)
Chroma—1 or 2
Texture—dominantly loam; silt loam or fine sandy loam in some pedons

Bk horizon:
Hue—10YR or 2.5Y
Value—3 to 6 (2 to 5 moist)
Chroma—2 to 4
Texture—loam, sandy loam, or fine sandy loam

2C horizon:
Hue—7.5YR, 10YR, or 2.5Y
Value—5 to 7 (4 or 5 moist)
Chroma—2 to 6
Texture—dominantly gravelly loamy sand or sand; loamy sand in some pedons

Talmo Series

Depth to bedrock: Very deep
Drainage class: Excessively drained
Permeability: Rapid
Landform: Outwash plains or till plains
Parent material: Glacial outwash
Slope range: 9 to 40 percent

Typical Pedon

Talmo gravelly loam, in an area of Ethan-Talmo complex, 15 to 40 percent slopes, 2,485 feet west and 1,320 feet north of the southeast corner of sec. 15, T. 94 N., R. 52 W.

A—0 to 9 inches; dark gray (10YR 4/1) gravelly loam, black (10YR 2/1) dry; weak fine and medium subangular blocky structure parting to weak fine granular; slightly hard, very friable; few fine and common very fine roots; few fine and common very fine vesicular and tubular pores; about 10 percent gravel; strong effervescence; slightly alkaline; clear wavy boundary.

2C1—9 to 14 inches; brown (10YR 5/3) gravelly sand, brown (10YR 4/3) moist; single grain; loose; common very fine roots throughout; many very fine interstitial pores; about 25 percent gravel; strong effervescence; moderately alkaline; clear wavy boundary.

2C2—14 to 40 inches; yellowish brown (10YR 5/4) very gravelly sand, dark yellowish brown (10YR 4/4) moist; single grain; loose; few very fine roots; many very fine interstitial pores; about 40 percent gravel; strong effervescence; moderately alkaline; gradual wavy boundary.

2C3—40 to 66 inches; yellowish brown (10YR 5/4) very gravelly sand, dark yellowish brown (10YR 4/4) moist; single grain; loose; many very fine interstitial pores; common medium and coarse soft masses of iron; about 40 percent gravel; strong effervescence; moderately alkaline; gradual wavy boundary.

2C4—66 to 80 inches; reddish yellow (7.5YR 6/6) fine sand, brown (7.5YR 4/4) moist; single grain;

loose; many very fine interstitial pores; slight effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 7 to 14 inches
Depth to carbonates: 0 to 10 inches
Depth to contrasting parent material: 5 to 14 inches over outwash sand and gravel
Depth to gypsum and other visible salts: More than 60 inches
Other features: Some pedons do not have fine sand below a depth of 60 inches.

A horizon:
Hue—10YR
Value—3 to 5 (2 or 3 moist)
Chroma—1 or 2
Texture—dominantly gravelly loam; loam, sandy loam, or gravelly sandy loam in some pedons

2C horizon:
Hue—10YR or 2.5Y
Value—5 to 7 (4 to 6 moist)
Chroma—2 to 4
Texture—gravelly sand, very gravelly sand, very gravelly loamy sand, extremely gravelly loamy sand, extremely gravelly sand, or fine sand

Tetonka Series

Depth to bedrock: Very deep
Drainage class: Poorly drained
Permeability: Slow
Landform: Till plains or outwash plains
Parent material: Local alluvium
Slope range: 0 to 1 percent

Typical Pedon

Tetonka silt loam, in an area of Egan-Ethan-Tetonka complex, 0 to 6 percent slopes, 1,700 feet east and 180 feet north of the southwest corner of sec. 19, T. 95 N., R. 53 W.

Ap—0 to 8 inches; dark gray (10YR 4/1) silt loam, black (10YR 2/1) moist; moderate medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine roots throughout; common very fine tubular pores; neutral; abrupt smooth boundary.

A/E—8 to 12 inches; gray (10YR 5/1) and dark gray (10YR 4/1) silt loam, dark gray (10YR 4/1) and very dark gray (10YR 3/1) moist; weak medium blocky and weak thin platy structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine roots throughout; few fine and many very fine tubular pores; neutral; clear wavy boundary.

E—12 to 20 inches; gray (10YR 6/1) silt loam, dark gray (10YR 4/1) moist; moderate thin platy structure parting to moderate fine blocky; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots throughout; few fine and many very fine tubular pores; neutral; gradual wavy boundary.

Bt—20 to 31 inches; gray (5Y 5/1) silty clay, dark olive gray (5Y 3/2) moist; moderate coarse prismatic structure parting to moderate and strong medium blocky; many continuous distinct clay films on faces of peds and in pores; hard, firm, sticky and plastic; common very fine roots between peds; few fine and common very fine tubular pores; slightly alkaline; gradual wavy boundary.

Btg1—31 to 38 inches; gray (5Y 5/1) silty clay, olive gray (5Y 4/2) moist; common fine prominent yellowish brown (10YR 5/6) redox concentrations; moderate coarse prismatic structure parting to moderate and strong blocky; very hard, very firm, sticky and plastic; few very fine roots between peds; few fine and common very fine tubular pores; many continuous distinct clay films on faces of peds and in pores; slightly alkaline; gradual wavy boundary.

Btg2—38 to 49 inches; gray (5Y 5/1) silty clay, olive gray (5Y 4/2) moist; many fine and medium prominent yellowish brown (10YR 5/6) and strong brown (7.5YR 5/8) redox concentrations; weak medium prismatic structure parting to moderate medium blocky; very hard, very firm, sticky and plastic; few fine and common very fine tubular pores; common continuous distinct clay films on faces of peds and in pores; slightly alkaline; gradual wavy boundary.

Btg3—49 to 59 inches; gray (5Y 6/1) silty clay, olive gray (5Y 4/2) moist; many medium and common coarse prominent strong brown (7.5YR 5/8) redox concentrations; weak medium subangular blocky structure; very hard, very firm, sticky and plastic; few fine and many very fine vesicular and tubular pores; few patchy distinct clay films in root channels and pores; few fine iron-manganese concretions; slightly alkaline; gradual wavy boundary.

Cg—59 to 80 inches; gray (5Y 6/1) silty clay loam, olive gray (5Y 5/2) moist; many medium prominent strong brown (7.5YR 5/8) redox concentrations; massive; hard, firm, slightly sticky and slightly plastic; common fine and many very fine vesicular and tubular pores; few fine iron-manganese concretions; slightly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 24 to 50 inches
Depth to carbonates: 30 to more than 60 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: More than 60 inches
Other features: Some pedons have a Bg or Bkg horizon.

A horizon:
Hue—10YR
Value—4 or 5 (2 or 3 moist)
Chroma—1 or 2
Texture—silt loam or silty clay loam

E horizon:
Hue—10YR
Value—5 to 7 (3 to 5 moist)
Chroma—1 or 2
Texture—silt loam, loam, or silty clay loam

Bt horizon:
Hue—10YR, 2.5Y, 5Y, or N
Value—4 to 6 (2 to 4 moist)
Chroma—0 to 2
Texture—clay, silty clay, silty clay loam, or clay loam

Cg horizon:
Hue—2.5Y or 5Y
Value—5 to 7 (4 to 6 moist)
Chroma—1 to 4
Texture—dominantly clay loam, silty clay loam, clay, or silty clay; sandy loam or loam in some pedons

Thurman Series

Depth to bedrock: Very deep
Drainage class: Somewhat excessively drained
Permeability: Rapid
Landform: Till plains or outwash plains
Parent material: Eolian sand
Slope range: 0 to 30 percent

Typical Pedon

Thurman loamy fine sand, 2 to 6 percent slopes, 1,685 feet east and 135 feet south of the northwest corner of sec. 22, T. 93 N., R. 52 W.

Ap—0 to 8 inches; very dark gray (10YR 3/1) loamy fine sand, black (10YR 2/1) moist; weak medium subangular blocky structure parting to weak fine granular; slightly hard, very friable; many fine and very fine roots throughout; common very fine tubular pores; neutral; abrupt smooth boundary.

A1—8 to 19 inches; very dark gray (10YR 3/1) loamy fine sand, black (10YR 2/1) moist; weak medium subangular blocky structure; soft, loose; many fine and very fine roots throughout; common very fine tubular pores; neutral; clear smooth boundary.

A2—19 to 28 inches; dark gray (10YR 4/1) loamy fine sand, very dark gray (10YR 3/1) moist; weak medium subangular blocky structure; soft, loose; common fine and very fine roots throughout; few fine and common very fine tubular pores; neutral; clear smooth boundary.

AC—28 to 36 inches; dark grayish brown (2.5Y 4/2) loamy fine sand, very dark grayish brown (2.5Y 3/2) moist; weak medium subangular blocky structure breaking to single grain; soft, loose; common fine roots throughout; few fine and common very fine vesicular and tubular pores; neutral; gradual wavy boundary.

C1—36 to 42 inches; light olive brown (2.5Y 5/3) fine sand, olive brown (2.5Y 4/3) moist; single grain; loose; few fine roots throughout; many very fine vesicular and tubular pores; neutral; gradual wavy boundary.

C2—42 to 57 inches; light yellowish brown (2.5Y 6/3) fine sand, light olive brown (2.5Y 5/3) moist; single grain; loose; few fine roots throughout; few fine and many very fine vesicular pores; slightly alkaline; abrupt smooth boundary.

C3—57 to 80 inches; light yellowish brown (2.5Y 6/3) fine sand, light olive brown (2.5Y 5/3) moist; single grain; loose; many very fine interstitial pores; slight effervescence; slightly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 8 to 20 inches
Depth to carbonates: 30 to more than 60 inches
Depth to contrasting parent material: 40 to more than 60 inches over loamy glacial till
Depth to gypsum and other visible salts: More than 60 inches

A horizon:
Hue—10YR
Value—3 to 5 (2 or 3 moist)
Chroma—1 or 2
Texture—dominantly loamy fine sand; fine sand, sand, loamy sand, sandy loam, or fine sandy loam in some pedons

C horizon:
Hue—10YR or 2.5Y
Value—5 to 7 (4 or 5 moist)
Chroma—2 to 4

Texture—dominantly loamy fine sand or fine sand; loamy sand, sand, or very fine sand in some pedons

Ticonic Series

Depth to bedrock: Very deep
Drainage class: Well drained
Permeability: Rapid in the upper part and moderate in the lower part
Landform: Flood plains
Parent material: Alluvium
Slope range: 0 to 2 percent

Typical Pedon

Ticonic loamy fine sand (fig. 24), in an area of Ticonic-Grable complex, 0 to 2 percent slopes, 2,500 feet north and 150 feet west of the southeast corner of sec. 16, T. 92 N., R. 53 W.

Ap—0 to 9 inches; grayish brown (2.5Y 5/2) loamy fine sand, very dark grayish brown (2.5Y 3/2) moist; weak medium subangular blocky structure parting to weak fine granular; soft, very friable; common fine and very fine roots throughout; common very fine vesicular and tubular pores; slight effervescence; slightly alkaline; abrupt smooth boundary.

C1—9 to 13 inches; light olive brown (2.5Y 5/3) loamy fine sand, olive brown (2.5Y 4/3) moist; weak medium subangular blocky structure; soft, very friable; few fine and very fine roots throughout; few fine and common very fine vesicular and tubular pores; strong effervescence; moderately alkaline; clear smooth boundary.

C2—13 to 26 inches; light brownish gray (2.5Y 6/2), stratified fine sand and loamy fine sand, grayish brown (2.5Y 5/2) moist; single grain; loose; few fine roots throughout; common very fine vesicular pores; strong effervescence; moderately alkaline; abrupt smooth boundary.

2C3—26 to 50 inches; light brownish gray (2.5Y 6/2), stratified silt loam and very fine sandy loam, grayish brown (2.5Y 5/2) moist; few fine prominent yellowish brown (10YR 5/6) redox concentrations; massive; slightly hard to soft, very friable, slightly sticky; few fine roots throughout; few fine and many very fine vesicular and tubular pores; strong effervescence; moderately alkaline; abrupt smooth boundary.

3C4—50 to 80 inches; light brownish gray (2.5Y 6/2), stratified sand and fine sand, grayish brown (2.5Y 5/2) moist; few fine prominent yellowish brown (10YR 5/6) redox concentrations; single grain; loose; many very fine interstitial pores; slight effervescence; slightly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 4 to 9 inches
Depth to carbonates: 0 to 9 inches
Depth to contrasting parent material: 18 to 36 inches over loamy alluvium
Depth to gypsum and other visible salts: More than 60 inches
Other features: Some pedons have a 4C horizon of silt loam, silty clay loam, or silty clay.

A horizon:
Hue—10YR or 2.5Y
Value—4 to 6 (3 to 5 moist)
Chroma—2 or 3
Texture—dominantly loamy fine sand; fine sand, fine sandy loam, or sandy loam in some pedons

C horizon:
Hue—10YR or 2.5Y
Value—5 to 7 (4 to 6 moist)
Chroma—2 or 3
Texture—dominantly stratified fine sand and loamy fine sand; sand or loamy sand in some pedons

2C horizon:
Hue—2.5Y
Value—5 to 7 (4 to 6 moist)
Chroma—2 to 4
Texture—dominantly stratified silt loam and very fine sandy loam; loam in some pedons

3C horizon:
Hue—2.5Y
Value—5 to 7 (4 to 6 moist)
Chroma—2 to 4
Texture—dominantly stratified sand and fine sand; loamy fine sand in some pedons

Trent Series

Depth to bedrock: Very deep
Drainage class: Moderately well drained
Permeability: Moderate
Landform: Till plains
Parent material: Silty glacial till
Slope range: 0 to 2 percent

Typical Pedon

Trent silty clay loam, in an area of Egan-Ethan-Trent complex, 1 to 6 percent slopes, 950 feet west and 275 feet south of the northeast corner of sec. 32, T. 95 N., R. 53 W.

Ap—0 to 9 inches; very dark gray (10YR 3/1) silty clay loam, black (10YR 2/1) moist; moderate fine and medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine and very fine roots throughout; common very fine vesicular and tubular pores; neutral; abrupt smooth boundary.

A—9 to 17 inches; very dark gray (10YR 3/1) silty clay loam, black (10YR 2/1) moist; moderate fine and medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine and very fine roots throughout; common very fine vesicular and tubular pores; neutral; clear smooth boundary.

Bw1—17 to 28 inches; very dark grayish brown (10YR 3/2) silty clay loam, very dark gray (10YR 3/1) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots throughout; few fine and common very fine vesicular and tubular pores; neutral; clear smooth boundary.

Bw2—28 to 47 inches; light olive brown (2.5Y 5/3) silty clay loam, olive brown (2.5Y 4/3) moist; weak medium prismatic structure parting to moderate medium blocky; slightly hard, friable, slightly sticky and slightly plastic; few fine and very fine roots throughout; few fine and many very fine vesicular and tubular pores; slightly alkaline; abrupt smooth boundary.

Bk1—47 to 52 inches; light yellowish brown (2.5Y 6/3) silty clay loam, light olive brown (2.5Y 5/3) moist; few fine prominent yellowish brown (10YR 5/6) redox concentrations and few fine distinct gray (N 6/0) redox depletions; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots between peds; few fine and many very fine vesicular and tubular pores; common medium soft masses of carbonate; strong effervescence; slightly alkaline; clear wavy boundary.

Bk2—52 to 64 inches; pale yellow (2.5Y 7/4) silty clay loam, light olive brown (2.5Y 5/4) moist; many fine prominent strong brown (7.5YR 5/6) redox concentrations and common fine prominent gray (N 6/0) redox depletions; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and many very fine vesicular and tubular pores; common fine and medium soft masses of carbonate; violent effervescence; moderately alkaline; clear wavy boundary.

C1—64 to 71 inches; light yellowish brown (2.5Y 6/4) silty clay loam, light olive brown (2.5Y 5/4) moist; many fine and medium prominent gray (N 6/0) redox depletions and few fine prominent yellowish brown (10YR 5/6) redox concentrations; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine and many very fine vesicular and tubular pores; strong effervescence; moderately alkaline; abrupt wavy boundary.

2C2—71 to 80 inches; pale yellow (2.5Y 7/4) clay loam, light olive brown (2.5Y 5/4) moist; many fine and medium prominent gray (N 6/0) redox depletions and common fine prominent yellowish brown (10YR 5/6) redox concentrations; massive; hard, friable, slightly sticky and slightly plastic; few fine and many very fine vesicular and tubular pores; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 20 to 40 inches
Depth to carbonates: 30 to 60 inches
Depth to contrasting parent material: 40 to more than 60 inches over loamy glacial till
Depth to gypsum and other visible salts: More than 60 inches
Other features: Some pedons do not have a 2C horizon of clay loam. This horizon is not included in the engineering index properties table.

A horizon:
Hue—10YR
Value—3 or 4 (2 or 3 moist)
Chroma—1 or 2
Texture—silty clay loam or silt loam

Bw horizon:
Hue—10YR or 2.5Y
Value—3 to 6 (2 to 5 moist)
Chroma—1 to 4
Texture—silty clay loam or silt loam

Bk horizon:
Hue—10YR or 2.5Y
Value—5 to 7 (4 to 6 moist)
Chroma—2 to 4
Texture—silty clay loam or silt loam

C horizon:
Hue—10YR or 2.5Y
Value—5 to 7 (4 to 6 moist)
Chroma—2 to 4
Texture—silty clay loam or silt loam

2C horizon:
Hue—10YR or 2.5Y
Value—5 to 7 (4 to 6 moist)

Chroma—2 to 4
Texture—clay loam or loam

Vore Series

Depth to bedrock: Very deep
Drainage class: Moderately well drained
Permeability: Moderate in the upper part and rapid in the lower part
Landform: Flood plains
Parent material: Alluvium
Slope range: 0 to 2 percent

Typical Pedon

Vore silty clay, in an area of Lossing-Vore silty clays, 0 to 2 percent slopes, 750 feet north and 275 feet west of the southeast corner of sec. 18, T. 92 N., R. 52 W.

Ap—0 to 8 inches; grayish brown (2.5Y 5/2) silty clay, very dark grayish brown (2.5Y 3/2) moist; moderate medium subangular blocky structure parting to moderate fine granular; hard, firm, sticky and plastic; common fine and very fine roots throughout; common very fine vesicular and tubular pores; slight effervescence; slightly alkaline; abrupt smooth boundary.

C1—8 to 23 inches; light brownish gray (2.5Y 6/2), stratified silty clay loam, dark grayish brown (2.5Y 4/2) moist; common fine and few medium prominent yellowish brown (10YR 5/6) redox concentrations; weak thin platy structure resulting from layering of sediments; slightly hard, very friable, slightly sticky and slightly plastic; common fine and very fine roots throughout; few fine and many very fine vesicular and tubular pores; strong effervescence; slightly alkaline; abrupt smooth boundary.

2C2—23 to 28 inches; light brownish gray (2.5Y 6/2) loamy fine sand, dark grayish brown (2.5Y 4/2) moist; many fine prominent yellowish brown (10YR 5/6) redox concentrations; massive or single grain; very friable and loose; few fine and very fine roots throughout; slight effervescence; slightly alkaline; clear smooth boundary.

2C3—28 to 80 inches; light brownish gray (2.5Y 6/2) fine sand with layers of grayish brown (2.5Y 5/2) silt loam less than 3 inches thick at depths of 45 and 51 inches; grayish brown (2.5Y 5/2) moist; common fine prominent yellowish brown (10YR 5/6) redox concentrations; single grain; loose; slight effervescence; slightly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 6 to 9 inches
Depth to carbonates: 0 to 9 inches
Depth to contrasting parent material: 15 to 30 inches over sandy alluvium
Depth to gypsum and other visible salts: More than 60 inches
Other features: Some pedons have a 3C horizon of stratified silty clay loam and silt loam below a depth of 60 inches.

A horizon:
Hue—10YR or 2.5Y
Value—4 (3 moist)
Chroma—1 or 2
Texture—silty clay or silty clay loam; very fine sandy loam or fine sandy loam overwash in some pedons

C horizon:
Hue—2.5Y
Value—5 to 7 (4 to 6 moist)
Chroma—2 to 4
Texture—silty clay loam with thin strata of silt loam and silty clay

2C horizon:
Hue—2.5Y
Value—5 to 7 (4 to 6 moist)
Chroma—2 to 4
Texture—fine sand or loamy fine sand

Wakonda Series

Depth to bedrock: Very deep
Drainage class: Moderately well drained
Permeability: Moderate
Landform: Till plains
Parent material: Silty glacial till
Slope range: 0 to 3 percent

Typical Pedon

Wakonda silt loam, in an area of Wakonda-Whitewood complex, 0 to 2 percent slopes, 350 feet west and 148 feet south of the northeast corner of sec. 27, T. 93 N., R. 52 W.

Ap—0 to 9 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium subangular blocky structure parting to weak fine granular; hard, friable, slightly sticky and slightly plastic; common fine and many very fine roots throughout; few very fine tubular pores; strong effervescence; slightly alkaline; abrupt smooth boundary.

Bky1—9 to 18 inches; light brownish gray (2.5Y 6/2) silt loam, dark grayish brown (2.5Y 4/2) moist; few fine prominent dark yellowish brown (10YR 4/4) redox concentrations; weak medium subangular blocky structure; hard, very friable, slightly sticky and slightly plastic; few fine and common very fine roots throughout; common very fine tubular pores; common fine and few medium soft masses of carbonate; common fine and few medium soft masses of gypsum; violent effervescence; moderately alkaline; clear wavy boundary.

Bky2—18 to 30 inches; light yellowish brown (2.5Y 6/3) silt loam, olive brown (2.5Y 4/3) moist; common fine prominent yellowish brown (10YR 5/6) and few fine prominent strong brown (7.5YR 5/8) redox concentrations; few fine distinct gray (2.5Y 5/1) redox depletions; weak medium subangular blocky structure; hard, very friable, slightly sticky and slightly plastic; few very fine roots throughout; few fine and common very fine tubular pores; few fine iron-manganese concretions; many fine and few medium soft masses of carbonate; common fine and few medium soft masses of gypsum; violent effervescence; moderately alkaline; gradual wavy boundary.

Bky3—30 to 35 inches; pale yellow (2.5Y 7/3) silt loam, light olive brown (2.5Y 5/3) moist; many fine prominent yellowish brown (10YR 5/6) and common fine prominent strong brown (7.5YR 5/8) redox concentrations; common fine distinct gray (2.5Y 5/1) redox depletions; weak medium subangular blocky structure; hard, very friable, slightly sticky and slightly plastic; few very fine roots throughout; few fine and many very fine tubular pores; few fine iron-manganese concretions; many fine and few medium soft masses of carbonate; many fine and few medium soft masses of gypsum; violent effervescence; moderately alkaline; clear smooth boundary.

Cgy1—35 to 62 inches; light gray (5Y 7/2) silt loam, olive gray (5Y 5/2) moist; common fine and medium prominent yellowish brown (10YR 5/6) and common fine and medium prominent strong brown (7.5YR 5/8) redox concentrations; common fine distinct gray (2.5Y 5/1) redox depletions; massive; hard, friable, slightly sticky and slightly plastic; common very fine tubular pores; common fine iron-manganese concretions; few fine carbonate concretions; many fine and few medium nests of gypsum; violent effervescence; moderately alkaline; abrupt smooth boundary.

2Cgy2—62 to 80 inches; pale yellow (2.5Y 7/3) loam, light olive brown (2.5Y 5/3) moist; many fine and medium prominent yellowish brown (10YR 5/6) and common fine and medium prominent strong brown (7.5YR 5/8) redox concentrations; common fine and medium distinct gray (2.5Y 5/1) redox depletions; massive; very hard, firm, slightly sticky and slightly plastic; common very fine tubular pores; common fine and medium carbonate concretions; common fine soft masses of gypsum; violent effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 7 to 16 inches
Depth to carbonates: 0 to 6 inches
Depth to contrasting parent material: 40 to more than 60 inches over loamy glacial till
Depth to gypsum and other visible salts: 7 to 16 inches
Other features: Some pedons do not have a 2Cgy horizon of clay loam, loam, sandy clay loam, or sandy loam.

A horizon:
Hue—10YR
Value—3 to 5 (2 or 3 moist)
Chroma—1 or 2
Texture—silty clay loam, silt loam, or loam

Bky horizon:
Hue—10YR or 2.5Y
Value—5 to 7 (3 to 5 moist)
Chroma—2 to 4
Texture—silt loam or silty clay loam

Cgy horizon:
Hue—2.5Y or 5Y
Value—5 to 7 (4 to 6 moist)
Chroma—1 to 4
Texture—silt loam or silty clay loam

2Cgy horizon:
Hue—2.5Y or 5Y
Value—5 to 7 (4 to 6 moist)
Chroma—1 to 4
Texture—dominantly clay loam or loam; sandy clay loam or sandy loam in some pedons

Wentworth Series

Depth to bedrock: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Till plains
Parent material: Silty glacial till
Slope range: 0 to 6 percent

Typical Pedon

Wentworth silty clay loam, in an area of Wentworth-Trent silty clay loams, 1 to 6 percent slopes, 1,447 feet west and 81 feet south of the northeast corner of sec. 24, T. 92 N., R. 51 W.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark gray (10YR 3/1) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and few fine roots throughout; common very fine vesicular and tubular pores; slightly acid; abrupt smooth boundary.

Bw1—7 to 11 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; few fine and very fine roots throughout; few fine tubular pores and common very fine vesicular and tubular pores; slightly acid; clear smooth boundary.

Bw2—11 to 18 inches; brown (10YR 4/3) silty clay loam, dark brown (10YR 3/3) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots throughout; few fine tubular pores and common very fine vesicular and tubular pores; neutral; clear wavy boundary.

Bw3—18 to 31 inches; brown (10YR 5/3) silty clay loam, brown (10YR 4/3) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots throughout; few fine and common very fine vesicular and tubular pores; neutral; abrupt smooth boundary.

Bk1—31 to 49 inches; pale brown (10YR 6/3) silty clay loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots throughout; few fine and many very fine vesicular and tubular pores; common fine soft masses of carbonate and few fine and medium carbonate nodules; strong effervescence; moderately alkaline; abrupt wavy boundary.

2Bk2—49 to 56 inches; light yellowish brown (2.5Y 6/4) clay loam, light olive brown (2.5Y 5/4) moist; common fine prominent dark yellowish brown (10YR 4/6) redox concentrations; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine roots between peds; few fine and many very fine vesicular and tubular pores; common fine soft masses of carbonate; strong effervescence; moderately alkaline; clear wavy boundary.

2C—56 to 80 inches; light yellowish brown (2.5Y 6/4) clay loam, light olive brown (2.5Y 5/4) moist; common fine prominent dark yellowish brown (10YR 4/6) redox concentrations and few fine prominent gray (10YR 5/1) redox depletions; massive; hard, friable, slightly sticky and slightly plastic; few fine and many very fine vesicular and tubular pores; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 8 to 20 inches
Depth to carbonates: 20 to 36 inches
Depth to contrasting parent material: 40 to more than 60 inches over loamy glacial till
Depth to gypsum and other visible salts: More than 60 inches
Other features: Some pedons do not have a 2Bk or 2C horizon below a depth of 40 inches.

A horizon:
Hue—10YR
Value—3 or 4 (2 or 3 moist)
Chroma—1 or 2
Texture—silty clay loam or silt loam

Bw horizon:
Hue—10YR or 2.5Y
Value—4 to 6 (2 to 4 moist)
Chroma—2 to 4
Texture—silty clay loam or silt loam

Bk horizon:
Hue—10YR or 2.5Y
Value—4 to 7 (4 to 6 moist)
Chroma—2 to 4
Texture—silty clay loam or silt loam

2Bk horizon:
Hue—10YR or 2.5Y
Value—4 to 7 (4 to 6 moist)
Chroma—2 to 4
Texture—clay loam or loam

2C horizon:
Hue—10YR or 2.5Y
Value—5 to 7 (4 to 6 moist)
Chroma—2 to 4
Texture—clay loam or loam

Whitewood Series

Depth to bedrock: Very deep
Drainage class: Somewhat poorly drained
Permeability: Moderately slow
Landform: Till plains
Parent material: Local alluvium
Slope range: 0 to 2 percent

Typical Pedon

Whitewood silty clay loam, in an area of Wakonda-Whitewood complex, 0 to 2 percent slopes, 2,080 feet east and 240 feet south of the northwest corner of sec. 26, T. 93 N., R. 52 W.

Ap—0 to 8 inches; dark gray (10YR 4/1) silty clay loam, black (10YR 2/1) moist; weak medium subangular blocky structure parting to weak fine subangular blocky; hard, friable, slightly sticky and slightly plastic; common fine and very fine roots throughout; common very fine tubular pores; slightly acid; abrupt smooth boundary.

A—8 to 14 inches; dark gray (10YR 4/1) silty clay loam, black (10YR 2/1) moist; weak medium subangular blocky structure parting to moderate fine subangular blocky; hard, friable, slightly sticky and slightly plastic; common fine and very fine roots throughout; few fine and common very fine tubular pores; slightly acid; clear smooth boundary.

Bw1—14 to 21 inches; grayish brown (10YR 5/2) and gray (10YR 5/1) silty clay loam, very dark grayish brown (10YR 3/2) and very dark gray (10YR 3/1) moist; common fine distinct dark yellowish brown (10YR 4/4) redox concentrations; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine and very fine roots throughout; few fine and many very fine tubular pores; neutral; clear wavy boundary.

Bw2—21 to 28 inches; grayish brown (2.5Y 5/2) silty clay loam, very dark grayish brown (2.5Y 3/2) moist; common fine prominent dark yellowish brown (10YR 4/4) and few fine distinct light olive brown (2.5Y 5/3) redox concentrations; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine and very fine roots throughout; few fine and many very fine tubular pores; few fine iron-manganese concretions; neutral; clear wavy boundary.

Bw3—28 to 32 inches; grayish brown (2.5Y 5/2) silty clay loam, very dark grayish brown (2.5Y 3/2) moist; common fine prominent dark yellowish brown (10YR 4/6) and common fine distinct light olive brown (2.5Y 5/3) redox concentrations; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine and very fine roots throughout; few fine and many very fine tubular pores; few fine iron-manganese concretions; neutral; clear smooth boundary.

Bg—32 to 48 inches; light olive gray (5Y 6/2) silty clay loam, olive gray (5Y 5/2) moist; common fine prominent dark yellowish brown (10YR 4/6) and common fine distinct light olive brown (2.5Y 5/3) redox concentrations; weak coarse subangular blocky structure parting to weak medium subangular blocky; hard, friable, slightly sticky and slightly plastic; few fine and very fine roots throughout; many very fine tubular pores; common fine iron-manganese concretions; slightly alkaline; abrupt smooth boundary.

Cg1—48 to 65 inches; light gray (5Y 7/2) silty clay loam, light olive gray (5Y 6/2) moist; many fine and common medium prominent dark yellowish brown (10YR 4/6) and common fine prominent strong brown (7.5YR 5/8) redox concentrations; common fine and medium distinct gray (5Y 5/1) redox depletions; massive; hard, friable, slightly sticky and slightly plastic; few very fine roots throughout; many very fine tubular pores; common fine iron-manganese concretions; strong effervescence; moderately alkaline; gradual wavy boundary.

Cg2—65 to 76 inches; light gray (5Y 7/2) silty clay loam, light olive gray (5Y 6/2) moist; many fine and medium prominent dark yellowish brown (10YR 4/6) and common fine and medium prominent strong brown (7.5YR 5/8) redox concentrations; many fine distinct gray (5Y 5/1) redox depletions; massive; hard, friable, slightly sticky and slightly plastic; many very fine tubular pores; common fine iron-manganese concretions; common fine and medium carbonate concretions; strong effervescence; moderately alkaline; abrupt wavy boundary.

2Cg3—76 to 80 inches; light gray (5Y 7/2) clay loam, light olive gray (5Y 6/2) moist; many fine and medium prominent dark yellowish brown (10YR 4/6) and common fine and medium prominent strong brown (7.5YR 5/8) redox concentrations; many fine distinct gray (5Y 5/1) redox depletions; massive; hard, friable, slightly sticky and slightly plastic; many very fine tubular pores; common fine iron-manganese concretions; common fine and medium carbonate concretions; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 24 to 30 inches
Depth to carbonates: 30 to 52 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: More than 60 inches

A horizon:
Hue—10YR, 5Y, or N
Value—3 or 4 (2 or 3 moist)

Chroma—0 or 1
Texture—silty clay loam or silt loam

Bw horizon:
Hue—10YR, 2.5Y, or 5Y
Value—4 or 5 (2 or 3 moist)
Chroma—1 or 2
Texture—silty clay loam or silt loam

Bg horizon:
Hue—2.5Y or 5Y
Value—5 to 7 (4 to 6 moist)
Chroma—1 or 2
Texture—silty clay loam or silt loam

Cg horizon:
Hue—2.5Y or 5Y
Value—5 to 7 (4 to 6 moist)
Chroma—1 or 2
Texture—silty clay loam or silt loam

2Cg horizon:
Hue—2.5Y or 5Y
Value—5 to 7 (4 to 6 moist)
Chroma—1 or 2
Texture—clay loam or loam

Worthing Series

Depth to bedrock: Very deep
Drainage class: Very poorly drained
Permeability: Slow
Landform: Till plains
Parent material: Local alluvium
Slope range: 0 to 1 percent

Typical Pedon

Worthing silty clay loam, 0 to 1 percent slopes, 825 feet north and 240 feet west of the southeast corner of sec. 18, T. 95 N., R. 53 W.

Ap—0 to 8 inches; very dark gray (10YR 3/1) silty clay loam, black (10YR 2/1) moist; weak medium subangular blocky structure parting to weak fine and medium granular; slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine roots throughout; few fine and common very fine tubular pores; moderately acid; abrupt smooth boundary.

A—8 to 18 inches; very dark gray (10YR 3/1) silty clay loam, black (10YR 2/1) moist; few fine distinct dark yellowish brown (10YR 4/4) redox concentrations; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots throughout; few fine and common very fine tubular pores; slightly acid; clear wavy boundary.

Btg1—18 to 24 inches; very dark gray (10YR 3/1) silty clay, black (10YR 2/1) moist; common fine distinct dark yellowish brown (10YR 4/4) redox concentrations; moderate medium prismatic structure parting to moderate fine and medium blocky; hard, firm, sticky and plastic; common fine and very fine roots between peds; few fine and common very fine tubular pores; common discontinuous prominent clay films on faces of peds and in pores; slightly acid; gradual wavy boundary.

Btg2—24 to 41 inches; dark gray (10YR 4/1) silty clay, black (10YR 2/1) moist; common fine distinct dark yellowish brown (10YR 4/6) redox concentrations; moderate medium prismatic structure parting to strong fine and medium blocky; hard, firm, sticky and plastic; few very fine roots between peds; few fine and common very fine tubular pores; many continuous prominent clay films on faces of peds and in pores; neutral; gradual wavy boundary.

Btg3—41 to 53 inches; gray (5Y 5/1) silty clay, very dark gray (5Y 3/1) moist; few medium prominent dark yellowish brown (10YR 4/6) redox concentrations; moderate medium prismatic structure parting to moderate fine and medium blocky; hard, firm, sticky and plastic; few very fine roots between peds; few fine and common very fine tubular pores; many continuous prominent clay films on faces of peds and in pores; neutral; abrupt wavy boundary.

Bkg—53 to 80 inches; light gray (5Y 7/2) silty clay loam, olive gray (5Y 4/2) moist; common medium prominent dark yellowish brown (10YR 4/6) and few fine and medium prominent strong brown (7.5YR 5/8) redox concentrations; weak fine and medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine roots between peds; few fine and many very fine tubular pores; few medium prominent very dark gray (10YR 3/1 moist) stains in root channels; common fine soft masses of carbonate; strong effervescence; slightly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 35 to more than 60 inches
Depth to carbonates: 35 to more than 60 inches
Depth to contrasting parent material: More than 60 inches
Depth to gypsum and other visible salts: More than 60 inches
Other features: Some pedons have a Cg horizon.

A horizon:

Hue—10YR, 5Y, or N
Value—3 or 4 (2 or 3 moist)
Chroma—0 or 1
Texture—dominantly silty clay loam; silt loam or silty clay in some pedons

Btg horizon:

Hue—10YR, 5Y, or N
Value—3 to 5 (2 or 3 moist)
Chroma—0 or 1
Texture—silty clay or clay

Bg or Bkg horizon:

Hue—2.5Y, 5Y, or N
Value—4 to 8 (3 to 6 moist)
Chroma—0 to 2
Texture—silty clay, clay, silty clay loam, or clay loam

Formation of the Soils

Soil forms when chemical and physical processes act on geologically deposited or accumulated material. The characteristics of the soil at any given point are determined by the physical and mineralogical composition of the parent material, the climate under which the soil material has accumulated and existed since accumulation, the plant and animal life on and in the soil, the relief, and the length of time that the forces of soil formation have acted on the soil material.

Climate and plant and animal life, chiefly plants, are active factors of soil formation. They act on the parent material and slowly change it to a natural body that has genetically related horizons. The effects of climate and plant and animal life are conditioned by relief. The parent material affects the kind of soil profile that forms and in extreme cases determines it almost entirely. Finally, time is needed for changing the parent material into a soil having genetically related horizons. Usually, a long time is required for the development of distinct horizons.

The factors of soil formation are so closely interrelated in their effects on the soil that few generalizations can be made regarding the effect of any one factor unless conditions are specified for the other four. The following paragraphs relate the factors of soil formation to the soils in Clay County.

Climate

Climate directly influences the rate of chemical and physical weathering. Clay County has a continental climate marked by cold winters and hot summers. This climate favors the growth of grasses and the resulting accumulation of organic matter in the upper part of the soil. The precipitation is sufficient to leach carbonates in most soils to an average depth of about 18 to 26 inches. The climate is generally uniform throughout the county and thus as a separate factor does not differentiate the soils within the county.

Plant and Animal Life

Plants, animals, insects, earthworms, bacteria, and fungi have an important effect on soil formation. They cause gains in organic matter, gains or losses in plant nutrients, and changes in soil structure and porosity. In Clay County, the tall and mid prairie grasses have had more influence than other living organisms on soil formation. As a result of these grasses, the surface layer of many soils has a moderate or high content of organic matter.

Earthworms, insects, and burrowing animals help to keep the soil open and porous. Bacteria, actinomycetes, and fungi decompose plant residue, thus releasing nutrients that plants use as food.

Parent Material

Most of the soils in Clay County formed in glacial material derived from preglacial formations of gneiss, granite, limestone, sandstone, siltstone, and shale. The glacier ground up and mixed this material. The resultant material is an aggregate of sand, silt, clay, and some rock fragments. When the glacier melted, the glacial material was redeposited. Some deposits consist of unsorted materials, or glacial till. The material in other deposits was sorted either by water as the material was deposited or by wind and water after it was deposited. Some thin deposits of loess also occur in the county, especially in areas adjacent to the flood plain along the Missouri River. These deposits are of relatively small extent.

Clay County is in the James River Lowland, James River Highland, and Coteau des Prairies divisions of the Central Lowlands physiographic province and the Missouri River Trench division of the Great Plains physiographic province (Flint, 1955). The county ranges from nearly level to rolling and has many wetlands. Various topographic features are apparent in the county. Spirit Mound and the flood plains along the Missouri and Vermillion Rivers are perhaps the most impressive. The county's surficial sediments consist of Pleistocene glacial deposits of Wisconsin and pre-Wisconsin ages and Recent deposits of alluvium, colluvium, and eolian sand (Christensen and Stephens, 1967a). The late Wisconsin deposits consist mainly of poorly sorted glacial till, stratified glacial outwash, and loess.

The loamy glacial till on most of the uplands in the western, central, and eastern parts of the county is brownish or yellowish loam or clay loam. It is friable or firm. Betts, Clarno, Davison, and Ethan soils formed in this loamy glacial till.

A loamy mantle of colluvial material overlies the glacial till in gently sloping areas and loamy to clayey alluvium in nearly level areas below the bluffs along the Missouri and Vermillion Rivers. Alcester and Davis soils formed in this material.

Glacial outwash consisting of sand, gravel, and loamy material is scattered throughout the county. This material was deposited by glacial meltwater. Delmont, Enet, and Talmo soils formed in loamy material underlain by sand and gravel.

Eolian sand, primarily fine sand, is in scattered areas along and above the bluffs adjacent to the flood plains along the Missouri and Vermillion Rivers. Thurman soils formed in this windblown sand.

Throughout much of the county, glacial till was deposited on glacial ice and then reworked by water as the glacier melted. Egan, Trent, Wakonda, and Wentworth soils formed in this silty glacial till. Wentworth and Trent soils can also occur in the small areas where soils formed in loess.

Chancellor, Tetonka, and Worthing soils formed partly or entirely in local alluvium that washed from adjacent upland soils. Baltic, Clamo, Dimo, Lex, Lossing, Luton, Onawa, Percival, and other soils formed in alluvium deposited by streams.

Relief

Relief affects soil formation through its influence on drainage, runoff, erosion, plant cover, and soil temperature. On the more sloping soils, such as Ethan soils, much of the rainfall is lost through runoff and does not penetrate the surface. Much of the surface soil is lost through erosion. As a result, these soils have a thin surface layer and are calcareous at or near the surface.

Runoff is slower in areas of Clarno, Egan, and other less sloping soils, and more rainfall penetrates the surface. These soils are calcareous at a greater depth than the Ethan soils. Also, the horizons in which organic matter accumulates are thicker.

Davis and Trent soils are in areas on footslopes that receive extra moisture in the form of runoff from adjacent soils. The layers in which organic matter accumulates are thicker than those in the Clarno and Egan soils. Also, calcium carbonate is leached to a greater depth. In low areas where drainage is impeded, the fluctuating water table favors the concentration of calcium carbonate and other soluble salts in Davison, Wakonda, and other soils. Tetonka and Worthing soils are in basins where water ponds. These soils have the colors characteristic of poorly drained soils.

Time

The length of time that soil material has been exposed to the other four factors of soil formation is reflected in the kinds of soil that have formed. The degree of profile development reflects the age of a soil. The oldest soils are on the parts of the landscape that have been stable for the longest time. In Clay County, these are Egan and Wentworth soils. The youngest soils either are those in which natural erosion removes nearly as much soil material as is formed through the weathering of parent material or are alluvial soils, which receive new material each time the area is flooded. Betts and Ethan soils are examples of young soils that are subject to natural erosion. Baltic, James, and Lamo soils are examples of young alluvial soils.

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Glossary

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Alpha,alpha-dipyridyl. A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redoximorphic feature.

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Area reclaim (in tables). Reclamation is difficult after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Backslope. The position that forms the steepest and generally linear, middle portion of a hillslope. In profile, backslopes are commonly bounded by a convex shoulder above and a concave footslope below.

Backswamp. An extensive depressed area of flood plains between natural levees and valley sides.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Basin. A depressed area with no surface outlet. Examples are closed depressions in a glacial till plain or lake basin.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Blowout. A shallow depression from which all or most of the soil material has been removed by the wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of pebbles or cobbles. In some blowouts the water table is exposed.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay depletions. Low-chroma zones having a low content of iron, manganese, and clay because of the chemical reduction of iron and manganese and the removal of iron, manganese, and clay. A type of redoximorphic depletion.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

COLE (coefficient of linear extensibility). See Linear extensibility.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the “Soil Survey Manual.”

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—***excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,*** and ***very poorly drained***. These classes are defined in the “Soil Survey Manual.”

Drainage, surface. Runoff, or surface flow of water, from an area.

Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Excess salt (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

Excess sodium (in tables). Excess exchangeable sodium in the soil. The resulting poor physical properties restrict the growth of plants.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called ***normal field capacity, normal moisture capacity,*** or ***capillary capacity***.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Footslope. The position that forms the inner, gently inclined surface at the base of a hillslope. In profile, footslopes are commonly concave. A footslope is a transition zone between upslope sites of erosion and transport (shoulders and backslopes) and downslope sites of deposition (toeslopes).

Forb. Any herbaceous plant not a grass or a sedge.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Glacial outwash. Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till. Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciofluvial deposits. Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that has 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Head slope. A geomorphic component of hills consisting of a laterally concave area of a hillside, especially at the head of a drainageway. The overland waterflow is converging.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

High-residue crops. Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the “Soil Survey Manual.” The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Interfluve. An elevated area between two drainageways that sheds water to those drainageways.

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

Iron depletions. Low-chroma zones having a low content of iron and manganese oxide because of chemical reduction and removal, but having a clay content similar to that of the adjacent matrix. A type of redoximorphic depletion.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Landform. Any physical, recognizable form or feature of the earth's surface, having a characteristic shape and produced by natural causes.

Landscape. A collection of related, natural landforms; usually refers to the land surface that the eye can comprehend in a single view.

Leaching. The removal of soluble material from soil or other material by percolating water.

Linear extensibility. Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at $^1/_3$- or $^1/_{10}$-bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration.

Meander belt. The flood plain area included between two imaginary lines drawn tangentially to the outer bends of active channel loops.

Mesophytic crop. Any crop adapted to grow under medium conditions of moisture.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Moraine (geology). An accumulation of earth, stones, and other debris deposited by a glacier. Some types are terminal, lateral, medial, and ground.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—***few, common,*** and ***many;*** size—***fine, medium,*** and ***coarse;*** and contrast—***faint, distinct,*** and ***prominent***. The size measurements are of the diameter along the greatest dimension. ***Fine*** indicates less than 5 millimeters (about 0.2 inch); ***medium,*** from 5 to 15 millimeters (about 0.2 to 0.6 inch); and ***coarse,*** more than 15 millimeters (about 0.6 inch).

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Natric horizon. A special kind of argillic horizon that contains enough exchangeable sodium to have an adverse effect on the physical condition of the subsoil.

Natural levees. A general term for broad, nearly level surfaces on a flood plain that are not subject to frequent inundation.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nodules. Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.

Nose slope. A geomorphic component of hills consisting of the projecting end (laterally convex area) of a hillside. The overland waterflow is predominantly divergent.

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it is generally low in relief.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, ***hardpan, fragipan, claypan, plowpan,*** and ***traffic pan***.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Pasture, tame. Grazing land planted to primarily introduced or domesticated native forage species. The areas receive periodic renovation or cultural treatment, or both.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the "Soil Survey Manual." In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour, are as follows:

Extremely slow	0.0 to 0.01 inch
Very slow	0.01 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid or very rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Range condition. The present composition of the plant community on a range site in relation to the potential natural plant community for that site. Range condition is expressed as excellent, good, fair, or poor on the basis of how much the present plant community has departed from the potential.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Range site. An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other range sites in kind or proportion of species or total production.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Redox concentrations. See Redoximorphic concentrations.

Redox depletions. See Redoximorphic depletions.

Redoximorphic concentrations. Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

Redoximorphic depletions. Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

Redoximorphic features. Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

Reduced matrix. A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redoximorphic feature.

Relief. The elevations or inequalities of a land surface, considered collectively.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shoulder slope. The position that forms the uppermost inclined surface near the top of a hillslope. It is a transition from backslope to summit. The surface is dominantly convex in profile and erosional in origin.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Side slope. A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. The slope classes recognized in this survey area are as follows:

Level	0 to 1 percent
Nearly level	0 to 2 or 3 percent
Gently sloping, gently undulating, or undulating	2 to 6 percent
Moderately sloping or gently rolling	6 to 9 percent
Strongly sloping or rolling	9 to 15 percent
Moderately steep, steep, or very steep	15 to 40 percent

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief and by the passage of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—***platy*** (laminated), ***prismatic*** (vertical axis of aggregates longer than horizontal), ***columnar*** (prisms with rounded tops), ***blocky*** (angular or subangular), and ***granular***. ***Structureless*** soils are either ***single grain*** (each grain by itself, as in dune sand) or ***massive*** (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summit. The topographically highest position of a hillslope. It has a nearly level (planar or only slightly convex) surface.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the “plow layer,” or the “Ap horizon.”

Surface soil. The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are ***sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,*** and ***clay***. The sand, loamy sand, and sandy loam classes may be further divided by specifying “coarse,” “fine,” or “very fine.”

Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.

Till plain. An extensive area of nearly level to undulating soils underlain by glacial till.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toeslope. The position that forms the gently inclined surface at the base of a hillslope. Toeslopes in profile are commonly gentle and linear and are constructional surfaces forming the lower part of a hillslope continuum that grades to valley or closed-depression floors.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Transitional layer. A layer of soil that grades to the next layer or includes parts of adjacent layers, commonly between the surface layer and subsoil or underlying layer.

Underlying layer. The C horizon or R layer; that part of the soil below the subsoil, commonly the parent material.

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley flats. A general term for broad, nearly level surfaces on a flood plain that are not subject to frequent inundation.

Valley sides. The sloping to very steep surfaces between the valley floor and summits of adjacent uplands.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Windthrow. The uprooting and tipping over of trees by the wind.

Tables

Table 1.--Temperature and Precipitation

(Recorded in the period 1961-90 at Vermillion, South Dakota)

Month	Temperature						Precipitation				
				2 years in 10 will have--				2 years in 10 will have--			
	Average daily maximum	Average daily minimum	Average	Maximum temperature higher than--	Minimum temperature lower than--	Average number of growing degree days*	Average	Less than--	More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	29.9	6.6	18.2	59	-26	2	0.40	0.12	0.63	1	4.8
February---	35.9	12.3	24.1	66	-23	11	.46	.14	.78	1	5.7
March------	48.2	24.3	36.3	81	-7	93	1.76	.57	2.73	4	6.1
April------	64.4	36.6	50.5	92	15	318	2.40	.98	3.61	5	1.4
May--------	75.5	48.0	61.7	95	25	632	3.68	2.00	5.15	6	.0
June-------	84.7	57.6	71.2	101	39	851	3.81	1.97	5.42	6	.0
July-------	89.3	63.1	76.2	103	45	1,027	3.36	1.72	4.79	5	.0
August-----	86.3	60.3	73.3	102	41	960	2.93	1.50	4.18	5	.0
September--	78.1	50.3	64.2	98	28	677	2.40	1.21	3.44	4	.0
October----	66.3	37.9	52.1	89	17	377	1.75	.49	2.77	3	.6
November---	48.0	24.9	36.5	74	-3	70	1.10	.21	1.84	2	3.8
December---	32.9	11.4	22.1	62	-21	5	.66	.25	1.00	1	6.9
Yearly:											
Average---	61.6	36.1	48.9	---	---	---	---	---	---	---	---
Extreme---	108	-33	---	105	-28	---	---	---	---	---	---
Total-----	---	---	---	---	---	5,023	24.71	17.16	29.70	43	29.3

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

Table 2.--Freeze Dates in Spring and Fall

(Recorded in the period 1961-90 at Vermillion, South Dakota)

Probability	Temperature: 24 °F or lower	Temperature: 28 °F or lower	Temperature: 32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	May 3	May 14	May 16
2 years in 10 later than--	Apr. 26	May 8	May 12
5 years in 10 later than--	Apr. 14	Apr. 27	May 4
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 4	Sept. 22	Sept. 16
2 years in 10 earlier than--	Oct. 9	Sept. 27	Sept. 20
5 years in 10 earlier than--	Oct. 19	Oct. 7	Sept. 29

Table 3.--Growing Season

(Recorded in the period 1961-90 at Vermillion, South Dakota)

Probability	Daily minimum temperature during growing season: Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	154	135	128
8 years in 10	162	143	134
5 years in 10	178	158	145
2 years in 10	193	173	156
1 year in 10	201	180	161

Table 4.--Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
Ac	Albaton silty clay, 0 to 2 percent slopes	3,104	1.2
Ad	Albaton silty clay, depressional	361	0.1
AeA	Alcester silty clay loam, 0 to 2 percent slopes	382	0.1
Ba	Baltic silty clay loam, 0 to 1 percent slopes	4,962	1.9
Bb	Blake silty clay loam, 0 to 2 percent slopes	1,330	0.5
Bf	Blencoe silty clay, 0 to 2 percent slopes, clayey substratum	9,850	3.7
Bg	Blyburg silt loam, 0 to 2 percent slopes	3,400	1.3
Bk	Blyburg-Gayville silt loams, 0 to 2 percent slopes	813	0.3
Bm	Bon loam, 0 to 2 percent slopes	1,792	0.7
Bn	Bon loam, channeled	785	0.3
Ca	Chancellor-Tetonka complex, 0 to 2 percent slopes	1,084	0.4
Cc	Chaska silt loam, channeled	1,679	0.6
Cd	Clamo silty clay, 0 to 1 percent slopes	1,453	0.5
DaA	Dalesburg loam, 0 to 2 percent slopes	350	0.1
DbB	Dalesburg-Dimo complex, 1 to 4 percent slopes	1,105	0.4
DcA	Davis loam, 0 to 2 percent slopes	699	0.3
DcB	Davis loam, 2 to 6 percent slopes	2,143	0.8
DhA	Davison-Chancellor complex, 0 to 3 percent slopes	2,789	1.0
DkA	Davison-Tetonka-Egan complex, 0 to 3 percent slopes	11,451	4.3
DmB	Delmont-Enet loams, 2 to 6 percent slopes	848	0.3
DnD	Delmont-Talmo complex, 6 to 15 percent slopes	55	*
Do	Dimo clay loam, 0 to 2 percent slopes	327	0.1
EaA	Egan-Chancellor-Davison complex, 0 to 3 percent slopes	24,399	9.2
EbA	Egan-Clarno-Chancellor complex, 0 to 3 percent slopes	16,861	6.4
EcA	Egan-Clarno-Tetonka complex, 0 to 2 percent slopes	10,055	3.8
EdA	Egan-Clarno-Trent complex, 0 to 2 percent slopes	12,755	4.9
EdB	Egan-Clarno-Trent complex, 1 to 6 percent slopes	5,619	2.1
EeB	Egan-Ethan complex, 2 to 6 percent slopes	181	*
EfB	Egan-Ethan-Tetonka complex, 0 to 6 percent slopes	7,375	2.8
EgB	Egan-Ethan-Trent complex, 1 to 6 percent slopes	18,645	7.0
EhA	Egan-Trent silty clay loams, 0 to 2 percent slopes	9,910	3.7
EhB	Egan-Trent silty clay loams, 1 to 6 percent slopes	377	0.1
Ek	Egan-Trent-Chancellor silty clay loams, 0 to 2 percent slopes	3,764	1.4
Em	Enet loam, 0 to 2 percent slopes, rarely flooded	432	0.2
EnB	Enet-Storla-Tetonka complex, 0 to 6 percent slopes	199	*
EoD	Ethan-Betts loams, 9 to 15 percent slopes	568	0.2
EoE	Ethan-Betts loams, 15 to 40 percent slopes	3,043	1.1
EpD	Ethan-Bon, channeled, loams, 0 to 20 percent slopes	2,877	1.1
EpE	Ethan-Bon, channeled, loams, 0 to 40 percent slopes	1,494	0.6
ErC	Ethan-Clarno loams, 6 to 9 percent slopes	2,022	0.8
ErD	Ethan-Clarno loams, 9 to 15 percent slopes	2,290	0.9
EsB	Ethan-Clarno-Bon loams, 0 to 6 percent slopes	1,500	0.6
EtC	Ethan-Clarno-Bon, channeled, loams, 0 to 9 percent slopes	2,163	0.8
EuB	Ethan-Davison-Tetonka complex, 0 to 6 percent slopes	1,012	0.4
EvC	Ethan-Egan complex, 6 to 9 percent slopes	174	*
EzE	Ethan-Talmo complex, 15 to 40 percent slopes	90	*
Fo	Forney silty clay, 0 to 2 percent slopes	2,579	1.0
Ga	Grable silt loam, 0 to 2 percent slopes	415	0.2
Gt	Grable-Ticonic-Vore complex, 0 to 2 percent slopes	1,376	0.5
Gv	Grable-Vore-Haynie complex, 0 to 3 percent slopes	964	0.4
Ha	Haynie silt loam, 0 to 2 percent slopes	735	0.3
Hg	Haynie-Grable silt loams, 0 to 2 percent slopes	1,515	0.6
Hn	Haynie-Lossing-Grable complex, 0 to 2 percent slopes	1,413	0.5
Ho	Haynie-Onawa-Blake complex, 0 to 2 percent slopes	2,281	0.9
Ja	James silty clay, 0 to 1 percent slopes	2,812	1.1
La	Lakeport silty clay loam, 0 to 2 percent slopes	1,576	0.6
Lb	Lamo silty clay loam, 0 to 2 percent slopes	430	0.2
Lc	Lamo silty clay loam, 0 to 2 percent slopes, sandy substratum	415	0.2
Ld	Lamo-Baltic silty clay loams, 0 to 2 percent slopes	2,690	1.0
Le	Lex clay loam, 0 to 2 percent slopes	2,107	0.8
Lg	Lossing silty clay, 0 to 2 percent slopes	1,845	0.7
Lo	Lossing-Owego silty clays, 0 to 2 percent slopes	1,406	0.5
Lr	Lossing-Vore silty clays, 0 to 2 percent slopes	1,991	0.7

See footnote at end of table.

Table 4.--Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Acres	Percent
Lt	Luton silty clay, 0 to 2 percent slopes, occasionally flooded	1,661	0.6
Lu	Luton silty clay, 0 to 2 percent slopes, rarely flooded	15,499	5.9
McA	Meckling loamy fine sand, 0 to 4 percent slopes	516	0.2
Mo	Modale silt loam, 0 to 2 percent slopes	590	0.2
Na	Napa-Luton complex, 0 to 2 percent slopes	2,702	1.0
Nb	Norway loamy fine sand, 0 to 4 percent slopes	865	0.3
NcA	Norway-Meckling loamy fine sands, 0 to 4 percent slopes	642	0.2
Oa	Onawa silty clay, 0 to 2 percent slopes	3,393	1.3
Ob	Onawa-Owego silty clays, 0 to 2 percent slopes	646	0.2
Oc	Orthents, channelized	856	0.3
Og	Orthents, gravelly	145	*
Om	Orthents, loamy	116	*
Os	Orthents, sandy	16	*
Ow	Owego silty clay, 0 to 2 percent slopes	3,918	1.5
Pe	Percival silty clay, 0 to 2 percent slopes	501	0.2
Ro	Roxbury silt loam, channeled	158	*
Sa	Salix silty clay loam, 0 to 2 percent slopes	1,422	0.5
Sd	Salmo silty clay loam, 0 to 1 percent slopes	1,337	0.5
SeB	Sardak loamy fine sand, 2 to 9 percent slopes	573	0.2
SkB	Sardak-Scroll complex, 0 to 6 percent slopes	681	0.3
SpA	Scroll-Percival silty clays, 0 to 2 percent slopes	580	0.2
SpB	Scroll-Percival silty clays, 2 to 6 percent slopes	65	*
TaE	Talmo-Thurman complex, 15 to 40 percent slopes	25	*
Te	Tetonka silt loam, 0 to 1 percent slopes	180	*
ThA	Thurman loamy fine sand, 0 to 2 percent slopes	186	*
ThB	Thurman loamy fine sand, 2 to 6 percent slopes	563	0.2
ThC	Thurman loamy fine sand, 6 to 9 percent slopes	37	*
Tr	Ticonic-Grable complex, 0 to 2 percent slopes	982	0.4
TtA	Trent-Tetonka-Wakonda complex, 0 to 3 percent slopes	4,469	1.7
TwA	Trent-Wentworth silty clay loams, 0 to 2 percent slopes	3,483	1.3
W	Water	3,509	1.3
Wa	Wakonda-Tetonka silt loams, 0 to 2 percent slopes	1,468	0.5
Wc	Wakonda-Wentworth-Whitewood complex, 0 to 2 percent slopes	7,338	2.7
Wd	Wakonda-Whitewood complex, 0 to 2 percent slopes	1,727	0.6
WkB	Wentworth-Trent silty clay loams, 1 to 6 percent slopes	577	0.2
Wm	Whitewood silty clay loam, 0 to 2 percent slopes	341	0.1
Wo	Worthing silty clay loam, 0 to 1 percent slopes	623	0.2
Wp	Worthing silty clay loam, ponded	147	*
	Total	267,654	100.0

* Less than 0.1 percent.

Table 5.--Prime Farmland

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name)

Map symbol	Soil name
AeA	Alcester silty clay loam, 0 to 2 percent slopes
Bb	Blake silty clay loam, 0 to 2 percent slopes
Bf	Blencoe silty clay, 0 to 2 percent slopes, clayey substratum
Bg	Blyburg silt loam, 0 to 2 percent slopes
Bm	Bon loam, 0 to 2 percent slopes
DaA	Dalesburg loam, 0 to 2 percent slopes (where irrigated)
DbB	Dalesburg-Dimo complex, 1 to 4 percent slopes (where irrigated)
DcA	Davis loam, 0 to 2 percent slopes
DcB	Davis loam, 2 to 6 percent slopes
Do	Dimo clay loam, 0 to 2 percent slopes
EaA	Egan-Chancellor-Davison complex, 0 to 3 percent slopes
EbA	Egan-Clarno-Chancellor complex, 0 to 3 percent slopes
EcA	Egan-Clarno-Tetonka complex, 0 to 2 percent slopes (where drained)
EdA	Egan-Clarno-Trent complex, 0 to 2 percent slopes
EdB	Egan-Clarno-Trent complex, 1 to 6 percent slopes
EeB	Egan-Ethan complex, 2 to 6 percent slopes
EfB	Egan-Ethan-Tetonka complex, 0 to 6 percent slopes (where drained)
EgB	Egan-Ethan-Trent complex, 1 to 6 percent slopes
EhA	Egan-Trent silty clay loams, 0 to 2 percent slopes
EhB	Egan-Trent silty clay loams, 1 to 6 percent slopes
Ek	Egan-Trent-Chancellor silty clay loams, 0 to 2 percent slopes
Em	Enet loam, 0 to 2 percent slopes, rarely flooded
EsB	Ethan-Clarno-Bon loams, 0 to 6 percent slopes
*Fo	Forney silty clay, 0 to 2 percent slopes (where drained)
Ga	Grable silt loam, 0 to 2 percent slopes
Gt	Grable-Ticonic-Vore complex, 0 to 2 percent slopes
Gv	Grable-Vore-Haynie complex, 0 to 3 percent slopes
Ha	Haynie silt loam, 0 to 2 percent slopes
Hg	Haynie-Grable silt loams, 0 to 2 percent slopes
Hn	Haynie-Lossing-Grable complex, 0 to 2 percent slopes
Ho	Haynie-Onawa-Blake complex, 0 to 2 percent slopes
La	Lakeport silty clay loam, 0 to 2 percent slopes
Lb	Lamo silty clay loam, 0 to 2 percent slopes
Lc	Lamo silty clay loam, 0 to 2 percent slopes, sandy substratum
Le	Lex clay loam, 0 to 2 percent slopes
Lg	Lossing silty clay, 0 to 2 percent slopes
*Lo	Lossing-Owego silty clays, 0 to 2 percent slopes (where drained)
Lr	Lossing-Vore silty clays, 0 to 2 percent slopes
Mo	Modale silt loam, 0 to 2 percent slopes
Oa	Onawa silty clay, 0 to 2 percent slopes
*Ob	Onawa-Owego silty clays, 0 to 2 percent slopes (where drained)
*Ow	Owego silty clay, 0 to 2 percent slopes (where drained)
Sa	Salix silty clay loam, 0 to 2 percent slopes
ThA	Thurman loamy fine sand, 0 to 2 percent slopes (where irrigated)
ThB	Thurman loamy fine sand, 2 to 6 percent slopes (where irrigated)
Tr	Ticonic-Grable complex, 0 to 2 percent slopes
TtA	Trent-Tetonka-Wakonda complex, 0 to 3 percent slopes (where drained)
TwA	Trent-Wentworth silty clay loams, 0 to 2 percent slopes
Wc	Wakonda-Wentworth-Whitewood complex, 0 to 2 percent slopes
WkB	Wentworth-Trent silty clay loams, 1 to 6 percent slopes
Wm	Whitewood silty clay loam, 0 to 2 percent slopes

* Unless otherwise noted, these map units are considered to be drained as a result of downcutting of the Missouri River.

Table 6.--Soil Productivity Ratings

(The abbreviation "NS" means not suited)

Soil name and map symbol	Crop rating	Range rating	Productivity rating
Ac Albaton	62.70	42.70	62.70
Ad Albaton	35.50	41.40	41.40
AeA Alcester	89.10	58.90	89.10
Ba Baltic	59.60	54.10	59.60
Bb Blake	79.50	39.30	79.50
Bf Blencoe	82.10	47.20	82.10
Bg Blyburg	91.10	50.40	91.10
Bk Blyburg-Gayville	59.40	43.00	59.40
Bm Bon	78.90	63.00	78.90
Bn Bon	NS	64.60	64.60
Ca Chancellor-Tetonka	52.40	57.40	57.40
Cc Chaska	NS	63.40	63.40
Cd Clamo	57.00	68.40	68.40
DaA Dalesburg	71.20	59.50	71.20
DbB Dalesburg-Dimo	66.60	59.70	66.60
DcA Davis	88.50	59.80	88.50
DcB Davis	83.20	43.50	83.20
DhA Davison-Chancellor	58.10	53.60	58.10
DkA Davison-Tetonka-Egan	54.80	46.10	54.80
DmB Delmont-Enet	45.60	28.70	45.60
DnD Delmont-Talmo	20.50	20.70	20.70

Table 6.--Soil Productivity Ratings--Continued

Soil name and map symbol	Crop rating	Range rating	Productivity rating
Do----------------------------- Dimo	66.60	59.90	66.60
EaA---------------------------- Egan-Chancellor-Davison	68.60	48.60	68.60
EbA---------------------------- Egan-Clarno-Chancellor	78.00	46.20	78.00
EcA---------------------------- Egan-Clarno-Tetonka	67.00	43.30	67.00
EdA---------------------------- Egan-Clarno-Trent	81.80	45.00	81.80
EdB---------------------------- Egan-Clarno-Trent	79.30	43.90	79.30
EeB---------------------------- Egan-Ethan	68.80	37.00	68.80
EfB---------------------------- Egan-Ethan-Tetonka	59.60	39.90	59.60
EgB---------------------------- Egan-Ethan-Trent	74.20	41.20	74.20
EhA---------------------------- Egan-Trent	85.90	48.50	85.90
EhB---------------------------- Egan-Trent	83.80	47.40	83.80
Ek----------------------------- Egan-Trent-Chancellor	79.70	51.60	79.70
Em----------------------------- Enet	73.20	53.00	73.20
EnB---------------------------- Enet-Storla-Tetonka	47.80	41.10	47.80
EoD---------------------------- Ethan-Betts	NS	29.50	29.50
EoE---------------------------- Ethan-Betts	NS	27.70	27.70
EpD---------------------------- Ethan-Bon	NS	40.90	40.90
EpE---------------------------- Ethan-Bon	NS	38.00	38.00
ErC---------------------------- Ethan-Clarno	53.60	34.70	53.60
ErD---------------------------- Ethan-Clarno	NS	32.30	32.30
EsB---------------------------- Ethan-Clarno-Bon	66.60	41.00	66.60

Table 6.--Soil Productivity Ratings--Continued

Soil name and map symbol	Crop rating	Range rating	Productivity rating
EtC: Ethan-Clarno-Bon	43.20	40.00	43.20
EuB: Ethan-Davison-Tetonka	47.70	41.20	47.70
EvC: Ethan-Egan	54.60	34.30	54.60
EzE: Ethan-Talmo	NS	24.50	24.50
Fo: Forney	67.20	45.50	67.20
Ga: Grable	69.90	52.60	69.90
Gt: Grable-Ticonic-Vore	64.70	45.40	64.70
Gv: Grable-Vore-Haynie	76.60	46.20	76.60
Ha: Haynie	86.20	44.00	86.20
Hg: Haynie-Grable	78.90	47.80	78.90
Hn: Haynie-Lossing-Grable	82.90	46.70	82.90
Ho: Haynie-Onawa-Blake	81.50	44.00	81.50
Ja: James	NS	31.10	31.10
La: Lakeport	97.80	40.30	97.80
Lb: Lamo	69.00	70.30	70.30
Lc: Lamo	64.80	70.30	70.30
Ld: Lamo-Baltic	66.20	65.30	66.20
Le: Lex	62.50	55.10	62.50
Lg: Lossing	88.70	45.70	88.70
Lo: Lossing-Owego	83.20	46.00	83.20
Lr: Lossing-Vore	83.50	43.40	83.50

Table 6.--Soil Productivity Ratings--Continued

Soil name and map symbol	Crop rating	Range rating	Productivity rating
Lt: Luton	58.40	69.90	69.90
Lu: Luton	60.30	69.90	69.90
McA: Meckling	40.20	52.30	52.30
Mo: Modale	86.10	48.90	86.10
Na: Napa-Luton	NS	39.50	39.50
Nb: Norway	NS	2.40	2.40
NcA: Norway-Meckling	NS	18.10	18.10
Oa: Onawa	76.20	45.70	76.20
Ob: Onawa-Owego	75.80	46.00	75.80
Oc: Orthents	NS	9.80	9.80
Og: Orthents	NS	8.90	8.90
Om: Orthents	NS	17.80	17.80
Os: Orthents	NS	9.80	9.80
Ow: Owego	75.10	46.30	75.10
Pe: Percival	62.50	43.50	62.50
Ro: Roxbury	NS	63.40	63.40
Sa: Salix	100.00	44.90	100.00
Sd: Salmo	NS	31.80	31.80
SeB: Sardak	NS	33.10	33.10
SkB: Sardak-Scroll	NS	34.10	34.10
SpA: Scroll-Percival	58.40	39.10	58.40

Table 6.--Soil Productivity Ratings--Continued

Soil name and map symbol	Crop rating	Range rating	Productivity rating
SpB---------------------------- Scroll-Percival	48.20	38.00	48.20
TaE---------------------------- Talmo-Thurman	NS	24.60	24.60
Te----------------------------- Tetonka	32.00	47.00	47.00
ThA---------------------------- Thurman	37.90	35.80	37.90
ThB---------------------------- Thurman	33.80	34.80	34.80
ThC---------------------------- Thurman	NS	33.80	33.80
Tr----------------------------- Ticonic-Grable	57.20	43.30	57.20
TtA---------------------------- Trent-Tetonka-Wakonda	66.20	53.20	66.20
TwA---------------------------- Trent-Wentworth	89.20	53.00	89.20
Wa----------------------------- Wakonda-Tetonka	47.60	47.80	47.80
Wc----------------------------- Wakonda-Wentworth-Whitewood	69.00	48.90	69.00
Wd----------------------------- Wakonda-Whitewood	62.80	53.70	62.80
WkB---------------------------- Wentworth-Trent	85.80	50.40	85.80
Wm----------------------------- Whitewood	69.90	63.70	69.90
Wo----------------------------- Worthing	NS	33.40	33.40
Wp----------------------------- Worthing	NS	10.40	10.40

Table 7.--Yields per Acre of Crops and Pasture

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Corn	Soybeans	Oats	Alfalfa hay	Bromegrass-alfalfa
	Bu	Bu	Bu	Tons	AUM*
Ac------------------------ Albaton	80	29	55	3.0	4.9
Ad. Albaton					
AeA----------------------- Alcester	105	38	87	4.5	7.0
Ba------------------------ Baltic	68	23	65	3.0	5.0
Bb------------------------ Blake	90	30	85	4.2	6.8
Bf------------------------ Blencoe	98	35	75	4.4	6.8
Bg------------------------ Blyburg	108	39	85	4.8	7.9
Bk------------------------ Blyburg-Gayville	74	21	59	3.3	5.5
Bm------------------------ Bon	88	32	82	4.1	6.8
Bn. Bon					
Ca------------------------ Chancellor-Tetonka	72	25	45	2.3	3.1
Cc. Chaska					
Cd------------------------ Clamo	75	25	50	2.8	4.7
DaA----------------------- Dalesburg	85	28	75	3.5	6.0
DbB----------------------- Dalesburg-Dimo	80	26	71	3.2	5.4
DcA----------------------- Davis	105	38	85	4.5	7.0
DcB----------------------- Davis	97	35	83	4.2	6.6
DhA----------------------- Davison-Chancellor	73	24	61	2.6	4.4

See footnote at end of table.

Table 7.--Yields per Acre of Crops and Pasture--Continued

Soil name and map symbol	Corn	Soybeans	Oats	Alfalfa hay	Bromegrass-alfalfa
	Bu	Bu	Bu	Tons	AUM*
DkA: Davison-Tetonka-Egan	71	22	58	2.4	3.4
DmB: Delmont-Enet	60	19	53	1.6	2.6
DnD: Delmont-Talmo	25	7	27	0.8	1.8
Do: Dimo	81	27	72	3.0	4.9
EaA: Egan-Chancellor-Davison	84	29	70	3.2	5.4
EbA: Egan-Clarno-Chancellor	92	32	80	3.8	6.3
EcA: Egan-Clarno-Tetonka	83	29	67	3.1	4.9
EdA: Egan-Clarno-Trent	97	34	83	4.0	6.6
EdB: Egan-Clarno-Trent	93	33	81	3.9	6.4
EeB: Egan-Ethan	78	28	74	3.4	5.5
EfB: Egan-Ethan-Tetonka	72	25	61	2.8	4.6
EgB: Egan-Ethan-Trent	85	30	77	3.7	6.2
EhA: Egan-Trent	101	36	86	4.3	6.8
EhB: Egan-Trent	98	35	84	4.2	6.7
Ek: Egan-Trent-Chancellor	96	35	78	3.9	6.4
Em: Enet	85	30	75	3.7	6.2
EnB: Enet-Storla-Tetonka	63	20	49	2.0	2.8
EoD, EoE. Ethan-Betts					
EpD, EpE. Ethan-Bon					
ErC: Ethan-Clarno	62	20	59	2.7	4.5

See footnote at end of table.

Table 7.--Yields per Acre of Crops and Pasture--Continued

Soil name and map symbol	Corn	Soybeans	Oats	Alfalfa hay	Bromegrass-alfalfa
	Bu	Bu	Bu	Tons	AUM*
ErD. Ethan-Clarno					
EsB. Ethan-Clarno-Bon	74	26	72	3.4	5.6
EtC. Ethan-Clarno-Bon	50	16	47	2.2	3.3
EuB. Ethan-Davison-Tetonka	60	18	52	2.2	3.0
EvC. Ethan-Egan	64	21	59	2.7	4.4
EzE. Ethan-Talmo					
Fo. Forney	85	31	55	3.5	5.5
Ga. Grable	86	28	75	3.2	5.3
Gt. Grable-Ticonic-Vore	80	27	63	3.2	5.3
Gv. Grable-Vore-Haynie	93	32	73	3.9	6.4
Ha. Haynie	100	37	81	4.6	7.5
Hg. Haynie-Grable	94	33	78	4.0	6.6
Hn. Haynie-Lossing-Grable	100	36	79	4.2	6.9
Ho. Haynie-Onawa-Blake	97	35	78	4.2	7.1
Ja. James					
La. Lakeport	125	43	80	5.3	9.2
Lb. Lamo	80	30	62	3.8	6.4
Lc. Lamo	75	26	62	3.6	6.2
Ld. Lamo-Baltic	76	28	63	3.6	6.1
Le. Lex	70	26	61	3.4	5.5

See footnote at end of table.

Table 7.--Yields per Acre of Crops and Pasture--Continued

Soil name and map symbol	Corn	Soybeans	Oats	Alfalfa hay	Bromegrass-alfalfa
	Bu	Bu	Bu	Tons	AUM*
Lg---------------------- Lossing	110	40	78	4.5	7.0
Lo---------------------- Lossing-Owego	104	38	72	4.2	6.6
Lr---------------------- Lossing-Vore	104	37	72	4.4	6.8
Lt---------------------- Luton	80	27	44	3.0	4.9
Lu---------------------- Luton	80	27	44	3.4	5.5
McA--------------------- Meckling	45	12	35	3.0	4.8
Mo---------------------- Modale	110	37	70	4.8	8.2
Na. Napa-Luton					
Nb. Norway					
NcA. Norway-Meckling					
Oa---------------------- Onawa	98	35	66	3.7	6.2
Ob---------------------- Onawa-Owego	97	35	65	3.7	6.3
Oc, Og, Om, Os. Orthents					
Ow---------------------- Owego	96	34	64	3.8	6.4
Pe---------------------- Percival	80	27	55	3.2	5.4
Ro. Roxbury					
Sa---------------------- Salix	125	45	82	5.4	9.2
Sd. Salmo					
SeB. Sardak					
SkB. Sardak-Scroll					

See footnote at end of table.

Table 7.--Yields per Acre of Crops and Pasture--Continued

Soil name and map symbol	Corn	Soybeans	Oats	Alfalfa hay	Bromegrass-alfalfa
	Bu	Bu	Bu	Tons	AUM*
SpA---------------------- Scroll-Percival	72	24	56	3.0	4.8
SpB---------------------- Scroll-Percival	62	20	42	2.6	4.3
TaE. Talmo-Thurman					
Te----------------------- Tetonka	54	16	25	1.0	1.9
ThA---------------------- Thurman	55	17	33	1.6	2.5
ThB---------------------- Thurman	52	15	30	1.3	1.9
ThC. Thurman					
Tr----------------------- Ticonic-Grable	70	23	57	2.8	4.6
TtA---------------------- Trent-Tetonka-Wakonda	84	28	65	3.1	4.9
TwA---------------------- Trent-Wentworth	106	38	87	4.5	7.3
Wa----------------------- Wakonda-Tetonka	65	19	50	2.0	2.8
Wc----------------------- Wakonda-Wentworth-Whitewood	83	28	74	3.3	5.1
Wd----------------------- Wakonda-Whitewood	75	24	70	2.9	4.8
WkB---------------------- Wentworth-Trent	101	36	85	4.3	7.1
Wm----------------------- Whitewood	80	29	74	3.4	5.2
Wo, Wp. Worthing					

* Animal unit month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

Table 8.--Rangeland Characteristic Vegetation and Productivity

Range site, soil name, and map symbols	Potential natural plant community: Common plant name	Composition	Potential annual production for kind of growing season: Favorable	Average	Unfavorable
		Pct	Lb/acre	Lb/acre	Lb/acre
Clayey Overflow----------	Big bluestem----------------	35	4,400	3,800	2,700
Albaton: Ac	Prairie cordgrass-----------	15			
Baltic: Ba, Ld	Little bluestem-------------	15			
Blencoe: Bf	Switchgrass-----------------	10			
Clamo: Cd	Sideoats grama--------------	10			
Forney: Fo	Indiangrass-----------------	5			
Lakeport: La	Sedges----------------------	5			
Lossing: Hn, Lg, Lo, Lr	Forbs-----------------------	5			
Luton: Lt, Lu, Na					
Onawa: Ho, Oa, Ob					
Owego: Lo, Ob, Ow					
Percival: Pe, SpA, SpB					
Scroll: SkB, SpA, SpB					
Vore: Gt, Gv, Lr					
Limy Subirrigated--------	Little bluestem-------------	40	5,300	4,400	3,100
Davison: DhA, DkA, EaA, EuB	Big bluestem----------------	20			
	Porcupinegrass--------------	10			
Storla: EnB	Switchgrass-----------------	10			
Wakonda: TtA, Wa, Wc, Wd	Indiangrass-----------------	5			
	Sideoats grama--------------	5			
	Sedges----------------------	5			
	Forbs-----------------------	5			
Loamy Overflow-----------	Big bluestem----------------	55	5,600	4,800	3,300
Alcester: AeA	Switchgrass-----------------	10			
Bon: Bm, Bn, EpD, EpE, EsB, EtC	Forbs-----------------------	10			
	Little bluestem-------------	10			
Chancellor: Ca, DhA, EaA, EbA, Ek	Indiangrass-----------------	5			
	Sideoats grama--------------	5			
Dalesburg: DaA, DbB	Shrubs----------------------	5			
Dimo: DbB, Do					
Davis: DcA					
Enet: Em					
Roxbury: Ro					
Trent: EdA, EdB, EgB, EhA, EhB, Ek, TtA, TwA, WkB					
Whitewood: Wc, Wd, Wm					
Saline Lowland-----------	Cordgrasses-----------------	60	4,200	3,800	3,000
Gayville: Bk	Nuttall alkaligrass---------	15			
James: Ja	Inland saltgrass------------	10			
Napa: Na	Western wheatgrass----------	5			
Salmo: Sd	Sedges----------------------	5			
	Forbs-----------------------	5			
Sands--------------------	Big bluestem or sand bluestem	40	3,800	3,200	2,000
Sardak: SeB, SkB	Little bluestem-------------	20			
	Prairie sandreed------------	10			
	Porcupinegrass--------------	10			
	Sedges----------------------	5			
	Forbs-----------------------	5			
	Switchgrass-----------------	5			
	Needleandthread-------------	5			

Table 8.--Rangeland Characteristic Vegetation and Productivity--Continued

Range site, soil name, and map symbols	Potential natural plant community: Common plant name	Composition	Potential annual production for kind of growing season: Favorable	Average	Unfavorable
		Pct	Lb/acre	Lb/acre	Lb/acre
Sandy--------------------	Big bluestem or sand bluestem	30	4,100	3,400	2,300
Ticonic: Gt, Tr	Little bluestem-------------	20			
Thurman: TaE, ThA, ThB, ThC	Prairie sandreed------------	10			
	Porcupinegrass--------------	10			
	Needleandthread-------------	10			
	Sideoats grama--------------	5			
	Switchgrass-----------------	5			
	Sedges----------------------	5			
	Forbs-----------------------	5			
Shallow Marsh------------	Reedgrasses-----------------	35	7,500	6,800	5,400
Worthing: Wo	Slough sedge----------------	35			
	Forbs-----------------------	10			
	Prairie cordgrass-----------	10			
	Common spikesedge-----------	5			
	Cattail and bulrushes--------	5			
Shallow to Gravel--------	Needleandthread-------------	30	3,100	2,600	1,500
Delmont: DmB, DnD	Little bluestem-------------	15			
	Sideoats grama--------------	10			
	Plains muhly----------------	10			
	Sedges----------------------	10			
	Blue grama and hairy grama---	10			
	Prairie dropseed------------	5			
	Forbs-----------------------	5			
	Shrubs----------------------	5			
Silty--------------------	Little bluestem-------------	30	4,800	4,000	2,800
Blake: Bb, Ho	Big bluestem----------------	15			
Blyburg: Bg, Bk	Porcupinegrass--------------	10			
Clarno: EbA, EcA, EdA, EdB, ErC, ErD, EsB, EtC	Forbs-----------------------	10			
	Shrubs----------------------	10			
Davis: DcB	Green needlegrass-----------	5			
Egan: DkA, EaA, EbA, EcA, EdA, EdB, EeB, EfB, EgB, EhA, EhB, Ek, EvC	Prairie dropseed------------	5			
	Western wheatgrass----------	5			
	Switchgrass-----------------	5			
	Indiangrass-----------------	5			
Enet: DmB, EnB					
Grable: Ga, Gt, Gv, Hg, Hn, Tr					
Haynie: Gv, Ha, Hg, Hn, Ho					
Modale: Mo					
Salix: Sa					
Wentworth: TwA, Wc, WkB					
Subirrigated------------	Big bluestem----------------	60	5,900	5,100	3,600
Chaska: Cc	Forbs-----------------------	15			
Lamo: Lb, Lc, Ld	Indiangrass-----------------	5			
Lex: Le	Switchgrass-----------------	5			
Meckling: McA, NcA	Sedges----------------------	5			
	Little bluestem-------------	5			
	Prairie cordgrass-----------	5			

Table 8.--Rangeland Characteristic Vegetation and Productivity--Continued

Range site, soil name, and map symbols	Potential natural plant community		Potential annual production for kind of growing season		
	Common plant name	Composition	Favorable	Average	Unfavorable
		Pct	Lb/acre	Lb/acre	Lb/acre
Thin Upland	Little bluestem	30	3,800	3,100	2,100
Betts: EoD, EoE	Big bluestem	10			
Ethan: EeB, EfB, EgB,	Prairie dropseed	10			
EoD, EoE, EpD, EpE,	Sideoats grama	10			
ErC, ErD, EsB, EtC,	Forbs	10			
EuB, EvC, EzE	Shrubs	10			
Orthents: Om	Plains muhly	5			
	Needleandthread	5			
	Green needlegrass	5			
	Porcupinegrass	5			
Very Shallow	Needleandthread	30	2,600	2,200	1,300
Talmo: DnD, EzE, TaE	Sedges	15			
	Blue grama and hairy grama	15			
	Forbs	10			
	Plains muhly	10			
	Sideoats grama	10			
	Shrubs	10			
Wetland	Prairie cordgrass	70	6,700	6,100	4,900
Albaton: Ad	Sedges	5			
	Reed canarygrass	5			
	Reedgrasses	5			
	Canada wildrye	5			
	Switchgrass	5			
	Bluegrasses	5			
Wet Meadow	Sedges	40	5,700	5,200	3,400
Tetonka: Ca, DkA, EcA,	Reedgrasses	20			
EfB, EnB, EuB, Te, TtA,	Prairie cordgrass	15			
Wa	Reed canarygrass	5			
	Western wheatgrass	5			
	Rushes	5			
	Bluegrasses	5			
	Forbs	5			

Table 9.--Windbreaks and Environmental Plantings

(In Clay County, none of the soils are assigned to windbreak suitability group 4. Dashes indicate that trees generally do not grow to the given height on the soils in that group)

Windbreak suitability group, soil name, and map symbols	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
Group 1----------- Alcester: AeA Blyburg: Bg, Bk Bon: Bm, Bn, EpD, EpE, EsB, EtC Dalesburg: DaA, DbB Davis: DcA Dimo: DbB, Do Enet: Em Lakeport: La Owego: Lo, Ob, Ow Trent: EdA, EdB, EgB, EhA, EhB, Ek, TtA, TwA, WkB	Golden currant, Hansen hedgerose, juneberry, Mongolian cherry, Nanking cherry, Peking cotoneaster, redosier dogwood, skunkbush sumac, western sandcherry.	American plum, Amur honeysuckle, Amur maple, caragana, common chokecherry, common lilac, European cotoneaster, late lilac, Manchurian apricot, Sargent crabapple, Siberian apricot, silver buffaloberry.	Arnold hawthorn, Austrian pine, Black Hills spruce, black walnut, blue spruce, bur oak, eastern redcedar, European birdcherry, Manchurian crabapple, ponderosa pine, Rocky Mountain juniper, Russian-olive, Scotch pine, Siberian crabapple, Ussurian pear, white spruce.	European larch, golden willow, green ash, hackberry, honeylocust, laurel willow, Siberian larch, silver maple, white poplar, white willow.	Carolina poplar, eastern cottonwood, northwest poplar, plains cottonwood, robusta poplar, Siberian elm, Siouxland cottonwood.
Group 1K---------- Blake: Bb, Ho Chaska: Cc Davison: DhA, DkA, EaA, EuB Grable: Ga, Gt, Gv, Hg, Hn, Tr Haynie: Gv, Ha, Hg, Hn, Ho Lossing: Hn, Lg, Lo, Lr Meckling: McA, NcA Modale: Mo Onawa: Ho, Oa, Ob Percival: Pe, SpA, SpB Roxbury: Ro Storla: EnB Vore: Gt, Gv, Lr Wakonda: TtA, Wa, Wc, Wd	Golden currant, Hansen hedgerose, juneberry, Mongolian cherry, Nanking cherry, Peking cotoneaster, redosier dogwood, skunkbush sumac, western sandcherry.	American plum, Amur honeysuckle, caragana, common chokecherry, common lilac, European cotoneaster, late lilac, Manchurian apricot, Sargent crabapple, Siberian apricot, silver buffaloberry.	Arnold hawthorn, Austrian pine, Black Hills spruce, black walnut, blue spruce, bur oak, eastern redcedar, European birdcherry, Manchurian crabapple, ponderosa pine, Rocky Mountain juniper, Russian-olive, Scotch pine, Siberian crabapple, Ussurian pear, white spruce.	European larch, golden willow, green ash, hackberry, honeylocust, laurel willow, Siberian larch, white poplar, white willow.	Carolina poplar, eastern cottonwood, northwest poplar, plains cottonwood, robusta poplar, Siberian elm, Siouxland cottonwood.
Group 2----------- Blencoe: Bf Chancellor: Ca, DhA, EaA, EbA, Ek Forney: Fo Luton: Lt, Lu, Na Whitewood: Wc, Wd, Wm	False indigo, golden currant, highbush cranberry, redosier dogwood.	Amur maple, sandbar willow.	Boxelder, European larch, Russian-olive, Siberian larch, white spruce.	Golden willow, green ash, laurel willow, silver maple, white poplar, white willow.	Carolina poplar, eastern cottonwood, northwest poplar, plains cottonwood, robusta poplar, Siouxland cottonwood.

Table 9.--Windbreaks and Environmental Plantings--Continued

Windbreak suitability group, soil name, and map symbols	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
Group 2K: Albaton: Ac; Baltic: Ba, Ld; Lamo: Lb, Lc, Ld; Lex: Le	False indigo, golden currant, highbush cranberry, redosier dogwood.	Sandbar willow	Boxelder, European larch, Russian-olive, Siberian larch, white spruce.	Golden willow, green ash, laurel willow, white poplar, white willow.	Carolina poplar, eastern cottonwood, northwest poplar, plains cottonwood, robusta poplar, Siouxland cottonwood.
Group 3: Davis: DcB; Egan: DkA, EaA, EbA, EcA, EdA, EdB, EeB, EfB, EgB, EhA, EhB, Ek, EvC; Clarno: EbA, EcA, EdA, EdB, ErC, ErD, EsB, EtC; Salix: Sa; Wentworth: TwA, Wc, WkB	Golden currant, Hansen hedgerose, late lilac, Mongolian cherry, Nanking cherry, Peking cotoneaster, redosier dogwood, Russian almond, skunkbush sumac, western sandcherry.	American plum, Amur honeysuckle, Amur maple, Arnold hawthorn, caragana, common chokecherry, common lilac, eastern redcedar, European cotoneaster, Manchurian apricot, Rocky Mountain juniper, Siberian apricot, silver buffaloberry.	Austrian pine, Black Hills spruce, black walnut, blue spruce, bur oak, European birdcherry, European larch, hackberry, Manchurian crabapple, ponderosa pine, Russian-olive, Scotch pine, Siberian crabapple, Ussurian pear, white poplar, white spruce.	Green ash, honeylocust, silver maple.	Siberian elm.
Group 5: Thurman: ThA, ThB; Ticonic: Gt, Tr	Amur honeysuckle, European cotoneaster, golden currant, Nanking cherry, Peking cotoneaster, Russian almond, silver buffaloberry, skunkbush sumac, western sandcherry.	American plum, Arnold hawthorn, caragana, common chokecherry, common lilac, eastern redcedar, Manchurian apricot, Rocky Mountain juniper, Siberian apricot, Ussurian pear.	Bur oak, green ash, hackberry, honeylocust, Manchurian crabapple, ponderosa pine, Russian-olive, Siberian crabapple, white poplar.	Siberian elm	---
Group 6G: Delmont: DmB, DnD; Enet: DmB, EnB; Scroll: SkB, SpA, SpB	Amur honeysuckle, caragana, common lilac, European cotoneaster, Peking cotoneaster, silver buffaloberry.	Eastern redcedar, hackberry, Manchurian crabapple, Rocky Mountain juniper, Russian-olive, Siberian crabapple, Ussurian pear.	Green ash, honeylocust, ponderosa pine, white poplar.	Siberian elm	---
Group 7: Sardak: SeB, SkB; Thurman: ThC	---	Eastern redcedar, Rocky Mountain juniper.	Austrian pine, ponderosa pine.	---	---

Table 9.--Windbreaks and Environmental Plantings--Continued

Windbreak suitability group, soil name, and map symbols	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
Group 8 Betts: EoD Ethan: EeB, EfB, EgB, EoD, EpD, ErC, ErD, EsB, EtC, EuB, EvC Orthents: Om	American plum, Amur honeysuckle, caragana, common lilac, European cotoneaster, golden currant, Peking cotoneaster, silver buffaloberry.	Eastern redcedar, hackberry, Rocky Mountain juniper, Russian-olive, Ussurian pear, white poplar.	Green ash, honeylocust, ponderosa pine, Siberian elm.	---	---
Group 9W Gayville: Bk	Caragana, common lilac, Russian almond, silver buffaloberry, Ussurian pear.	Eastern redcedar, green ash, ponderosa pine, Rocky Mountain juniper, Russian-olive, Siberian elm.	---	---	---
Group 10 Albaton: Ad Betts: EoE Clamo: Cd Ethan: EoE, EpE, EzE James: Ja Napa: Na Norway: Nb, NcA Orthents: Oc, Og, Os Salmo: Sd Talmo: DnD, EzE, TaE Tetonka: Ca, DkA, EcA, EfB, EnB, EuB, Te, TtA, Wa Thurman: TaE Worthing: Wo, Wp	---	---	---	---	---

Table 10.--Recreational Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Ac: Albaton	Severe: wetness, percs slowly.	Severe: wetness, too clayey, percs slowly.	Severe: too clayey, wetness, percs slowly.	Severe: wetness, too clayey.
Ad: Albaton	Severe: ponding, percs slowly.	Severe: ponding, too clayey, percs slowly.	Severe: too clayey, ponding.	Severe: ponding, too clayey.
AeA: Alcester	Severe: flooding.	Slight	Slight	Slight.
Ba: Baltic	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Bb: Blake	Moderate: flooding.	Slight	Slight	Slight.
Bf: Blencoe	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.
Bg: Blyburg	Moderate: flooding.	Slight	Slight	Slight.
Bk:				
Blyburg	Moderate: flooding.	Slight	Slight	Slight.
Gayville	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Slight.
Bm: Bon	Severe: flooding.	Slight	Slight	Slight.
Bn: Bon	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.
Ca:				
Chancellor	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness, flooding.	Moderate: wetness.
Tetonka	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Cc: Chaska	Severe: flooding.	Moderate: flooding, wetness.	Severe: flooding.	Moderate: wetness, flooding.
Cd: Clamo	Severe: flooding, wetness, too clayey.	Severe: wetness, too clayey.	Severe: too clayey, wetness.	Severe: wetness, too clayey.
DaA: Dalesburg	Severe: flooding.	Slight	Moderate: flooding.	Slight.

Table 10.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
DbB:				
Dalesburg	Severe: flooding.	Slight	Moderate: slope, flooding.	Slight.
Dimo	Severe: flooding.	Moderate: wetness.	Moderate: wetness, flooding.	Moderate: wetness.
DcA Davis	Severe: wetness.	Slight	Moderate: wetness.	Slight.
DcB Davis	Slight	Slight	Moderate: slope.	Slight.
DhA:				
Davison	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Slight.
Chancellor	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness, flooding.	Moderate: wetness.
DkA:				
Davison	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Slight.
Tetonka	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Egan	Slight	Slight	Slight	Slight.
DmB:				
Delmont	Slight	Slight	Moderate: slope.	Slight.
Enet	Slight	Slight	Moderate: slope.	Slight.
DnD:				
Delmont	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Talmo	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight.
Do Dimo	Severe: flooding.	Moderate: wetness.	Moderate: wetness, flooding.	Moderate: wetness.
EaA:				
Egan	Slight	Slight	Slight	Slight.
Chancellor	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness, flooding.	Moderate: wetness.
Davison	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Slight.

Table 10.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
EbA:				
Egan	Slight	Slight	Slight	Slight.
Clarno	Slight	Slight	Slight	Slight.
Chancellor	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness, flooding.	Moderate: wetness.
EcA:				
Egan	Slight	Slight	Slight	Slight.
Clarno	Slight	Slight	Slight	Slight.
Tetonka	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
EdA:				
Egan	Slight	Slight	Slight	Slight.
Clarno	Slight	Slight	Slight	Slight.
Trent	Severe: wetness.	Slight	Moderate: wetness.	Slight.
EdB:				
Egan	Slight	Slight	Moderate: slope.	Slight.
Clarno	Slight	Slight	Moderate: slope.	Slight.
Trent	Severe: wetness.	Slight	Moderate: wetness.	Slight.
EeB:				
Egan	Slight	Slight	Moderate: slope.	Slight.
Ethan	Slight	Slight	Moderate: slope.	Slight.
EfB:				
Egan	Slight	Slight	Moderate: slope.	Slight.
Ethan	Slight	Slight	Moderate: slope.	Slight.
Tetonka	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
EgB:				
Egan	Slight	Slight	Moderate: slope.	Slight.
Ethan	Slight	Slight	Moderate: slope.	Slight.
Trent	Severe: wetness.	Slight	Moderate: wetness.	Slight.

Table 10.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
EhA:				
Egan	Slight	Slight	Slight	Slight.
Trent	Severe: wetness.	Slight	Moderate: wetness.	Slight.
EhB:				
Egan	Slight	Slight	Moderate: slope.	Slight.
Trent	Severe: wetness.	Slight	Moderate: wetness.	Slight.
Ek:				
Egan	Slight	Slight	Slight	Slight.
Trent	Severe: wetness.	Slight	Moderate: wetness.	Slight.
Chancellor	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness, flooding.	Moderate: wetness.
Em: Enet	Severe: flooding.	Slight	Slight	Slight.
EnB:				
Enet	Slight	Slight	Moderate: slope.	Slight.
Storla	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Slight.
Tetonka	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
EoD:				
Ethan	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Betts	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
EoE:				
Ethan	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Betts	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
EpD:				
Ethan	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Bon	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.
EpE:				
Ethan	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Bon	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.

Table 10.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
ErC:				
Ethan	Slight	Slight	Severe: slope.	Slight.
Clarno	Slight	Slight	Severe: slope.	Slight.
ErD:				
Ethan	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Clarno	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
EsB:				
Ethan	Slight	Slight	Moderate: slope.	Slight.
Clarno	Slight	Slight	Moderate: slope.	Slight.
Bon	Severe: flooding.	Slight	Slight	Slight.
EtC:				
Ethan	Slight	Slight	Severe: slope.	Slight.
Clarno	Slight	Slight	Severe: slope.	Slight.
Bon	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.
EuB:				
Ethan	Slight	Slight	Moderate: slope.	Slight.
Davison	Moderate: wetness.	Moderate: wetness.	Moderate: slope, wetness.	Slight.
Tetonka	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
EvC:				
Ethan	Slight	Slight	Severe: slope.	Slight.
Egan	Slight	Slight	Severe: slope.	Slight.
EzE:				
Ethan	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Talmo	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Fo: Forney	Severe: percs slowly.	Severe: too clayey, percs slowly.	Severe: too clayey, percs slowly.	Severe: too clayey.

Table 10.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Ga: Grable	Moderate: flooding.	Slight	Slight	Slight.
Gt:				
Grable	Moderate: flooding.	Slight	Slight	Slight.
Ticonic	Moderate: flooding.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.
Vore	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.
Gv:				
Grable	Moderate: flooding.	Slight	Slight	Slight.
Vore	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.
Haynie	Moderate: flooding.	Slight	Slight	Slight.
Ha: Haynie	Moderate: flooding.	Slight	Slight	Slight.
Hg:				
Haynie	Moderate: flooding.	Slight	Slight	Slight.
Grable	Moderate: flooding.	Slight	Slight	Slight.
Hn:				
Haynie	Moderate: flooding.	Slight	Slight	Slight.
Lossing	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.
Grable	Moderate: flooding.	Slight	Slight	Slight.
Ho:				
Haynie	Moderate: flooding.	Slight	Slight	Slight.
Onawa	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.
Blake	Moderate: flooding.	Slight	Slight	Slight.
Ja: James	Severe: flooding, wetness, percs slowly.	Severe: wetness, too clayey, excess salt.	Severe: too clayey, wetness.	Severe: wetness, too clayey.
La: Lakeport	Moderate: flooding.	Moderate: percs slowly.	Moderate: percs slowly.	Slight.

Table 10.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Lb, Lc------------------ Lamo	Severe: flooding.	Moderate: wetness, percs slowly.	Moderate: wetness, flooding, percs slowly.	Moderate: wetness.
Ld:				
Lamo-------------------	Severe: flooding.	Moderate: wetness, percs slowly.	Moderate: wetness, flooding, percs slowly.	Moderate: wetness.
Baltic-----------------	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Le--------------------- Lex	Severe: flooding.	Moderate: wetness, percs slowly.	Moderate: wetness, flooding, percs slowly.	Moderate: wetness.
Lg--------------------- Lossing	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.
Lo:				
Lossing----------------	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.
Owego------------------	Severe: wetness, percs slowly.	Severe: too clayey, percs slowly.	Severe: too clayey, wetness, percs slowly.	Severe: too clayey.
Lr:				
Lossing----------------	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.
Vore-------------------	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.
Lt, Lu----------------- Luton	Severe: flooding, wetness, percs slowly.	Severe: wetness, too clayey, percs slowly.	Severe: too clayey, wetness, percs slowly.	Severe: wetness, too clayey.
McA-------------------- Meckling	Severe: flooding.	Slight---------	Moderate: slope.	Slight.
Mo--------------------- Modale	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Slight.
Na:				
Napa-------------------	Severe: flooding, wetness, percs slowly.	Severe: wetness, excess sodium.	Severe: wetness, percs slowly.	Severe: wetness.
Luton------------------	Severe: flooding, wetness, percs slowly.	Severe: wetness, too clayey, percs slowly.	Severe: too clayey, wetness, percs slowly.	Severe: wetness, too clayey.

Table 10.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Nb----------------------- Norway	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.
NcA:				
Norway-------------------	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Meckling-----------------	Severe: flooding.	Slight-----------	Moderate: slope.	Slight.
Oa----------------------- Onawa	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.
Ob:				
Onawa--------------------	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.
Owego--------------------	Severe: wetness, percs slowly.	Severe: too clayey, percs slowly.	Severe: too clayey, wetness, percs slowly.	Severe: too clayey.
Oc----------------------- Orthents	Severe: flooding, slope, wetness.	Severe: slope, wetness.	Severe: slope, wetness.	Severe: wetness.
Og----------------------- Orthents	Moderate: small stones.	Moderate: small stones.	Severe: slope, small stones.	Slight.
Om----------------------- Orthents	Moderate: percs slowly.	Moderate: percs slowly.	Severe: slope.	Slight.
Os----------------------- Orthents	Slight-----------	Slight-----------	Severe: slope.	Slight.
Ow----------------------- Owego	Severe: wetness, percs slowly.	Severe: too clayey, percs slowly.	Severe: too clayey, wetness, percs slowly.	Severe: too clayey.
Pe----------------------- Percival	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.
Ro----------------------- Roxbury	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.
Sa----------------------- Salix	Slight-----------	Slight-----------	Slight-----------	Slight.
Sd----------------------- Salmo	Severe: flooding, wetness, excess salt.	Severe: wetness, excess salt.	Severe: wetness, flooding, excess salt.	Severe: wetness.
SeB---------------------- Sardak	Moderate: flooding.	Slight-----------	Moderate: slope.	Slight.

Table 10.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
SkB:				
Sardak	Moderate: flooding.	Slight	Moderate: slope.	Slight.
Scroll	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.
SpA, SpB:				
Scroll	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.
Percival	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.
TaE:				
Talmo	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Thurman	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Te Tetonka	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
ThA Thurman	Slight	Slight	Slight	Slight.
ThB Thurman	Slight	Slight	Moderate: slope.	Slight.
ThC Thurman	Slight	Slight	Severe: slope.	Slight.
Tr:				
Ticonic	Moderate: flooding.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.
Grable	Moderate: flooding.	Slight	Slight	Slight.
TtA:				
Trent	Severe: wetness.	Slight	Moderate: wetness.	Slight.
Tetonka	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Wakonda	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Slight.
TwA:				
Trent	Severe: wetness.	Slight	Moderate: wetness.	Slight.
Wentworth	Slight	Slight	Slight	Slight.
Wa:				
Wakonda	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Slight.
Tetonka	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.

Table 10.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Wc:				
Wakonda	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Slight.
Wentworth	Slight	Slight	Slight	Slight.
Whitewood	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
Wd:				
Wakonda	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Slight.
Whitewood	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
WkB:				
Wentworth	Slight	Slight	Moderate: slope.	Slight.
Trent	Severe: wetness.	Slight	Moderate: wetness.	Slight.
Wm Whitewood	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
Wo, Wp Worthing	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.

Table 11.--Wildlife Habitat

(See text for definitions of terms used in this table. Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Native herbaceous plants	Planted woody plants	Native deciduous trees	Native coniferous plants	Native shrubs	Wetland plants	Shallow water areas
Ac----------------- Albaton	Fair	Good	Good	Good	Poor	Very poor.	Fair	Fair	Fair.
Ad----------------- Albaton	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Good	Good.
AeA---------------- Alcester	Good	Good	Good	Good	Good	Poor	Good	Very poor.	Very poor.
Ba----------------- Baltic	Fair	Good	Good	Good	Fair	Very poor.	Fair	Fair	Fair.
Bb----------------- Blake	Good	Good	Good	Good	Good	Fair	Good	Very poor.	Very poor.
Bf----------------- Blencoe	Good	Good	Good	Good	Fair	Poor	Fair	Poor	Poor.
Bg----------------- Blyburg	Good	Good	Good	Good	Good	Fair	Good	Very poor.	Very poor.
Bk:									
Blyburg-----------	Good	Good	Good	Good	Good	Fair	Good	Very poor.	Very poor.
Gayville----------	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor.
Bm----------------- Bon	Good	Good	Good	Good	Fair	Poor	Good	Very poor.	Very poor.
Bn----------------- Bon	Very poor.	Very poor.	Good	Good	Fair	Poor	Fair	Very poor.	Very poor.
Ca:									
Chancellor--------	Good	Good	Good	Good	Poor	Very poor.	Fair	Poor	Poor.
Tetonka-----------	Poor	Poor	Fair	Very poor.	Poor	Very poor.	Poor	Good	Good.
Cc----------------- Chaska	Very poor.	Very poor.	Fair	Good	Good	Fair	Fair	Poor	Poor.
Cd----------------- Clamo	Poor	Poor	Good	Very poor.	Fair	Very poor.	Poor	Fair	Fair.
DaA---------------- Dalesburg	Good	Good	Good	Good	Good	Fair	Good	Very poor.	Very poor.
DbB:									
Dalesburg---------	Good	Good	Good	Good	Good	Fair	Good	Very poor.	Very poor.
Dimo--------------	Good	Good	Good	Good	Good	Poor	Fair	Poor	Poor.
DcA, DcB----------- Davis	Good	Good	Good	Good	Good	Poor	Good	Very poor.	Very poor.

Table 11.--Wildlife Habitat--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Native herbaceous plants	Planted woody plants	Native deciduous trees	Native coniferous plants	Native shrubs	Wetland plants	Shallow water areas
DhA:									
Davison	Good	Good	Fair	Good	Poor	Very poor.	Fair	Very poor.	Very poor.
Chancellor	Good	Good	Good	Good	Poor	Very poor.	Fair	Poor	Poor.
DkA:									
Davison	Good	Good	Fair	Good	Poor	Very poor.	Fair	Very poor.	Very poor.
Tetonka	Poor	Poor	Fair	Very poor.	Poor	Very poor.	Poor	Good	Good.
Egan	Good	Good	Good	Good	Poor	Very poor.	Poor	Very poor.	Very poor.
DmB:									
Delmont	Poor	Fair	Poor	Poor	Poor	Very poor.	Poor	Very poor.	Very poor.
Enet	Fair	Fair	Good	Poor	Poor	Very poor.	Poor	Very poor.	Very poor.
DnD:									
Delmont	Poor	Fair	Poor	Poor	Poor	Very poor.	Poor	Very poor.	Very poor.
Talmo	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.
Do Dimo	Good	Good	Good	Good	Good	Poor	Fair	Poor	Poor.
EaA:									
Egan	Good	Good	Good	Good	Poor	Very poor.	Poor	Very poor.	Very poor.
Chancellor	Good	Good	Good	Good	Poor	Very poor.	Fair	Poor	Poor.
Davison	Good	Good	Fair	Good	Poor	Very poor.	Fair	Very poor.	Very poor.
EbA:									
Egan	Good	Good	Good	Good	Poor	Very poor.	Poor	Very poor.	Very poor.
Clarno	Good	Good	Good	Good	Poor	Very poor.	Poor	Very poor.	Very poor.
Chancellor	Good	Good	Good	Good	Poor	Very poor.	Fair	Poor	Poor.
EcA:									
Egan	Good	Good	Good	Good	Poor	Very poor.	Poor	Very poor.	Very poor.
Clarno	Good	Good	Good	Good	Poor	Very poor.	Poor	Very poor.	Very poor.

Table 11.--Wildlife Habitat--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Native herba-ceous plants	Planted woody plants	Native decid-uous trees	Native conif-erous plants	Native shrubs	Wetland plants	Shallow water areas
EcA:									
Tetonka	Poor	Poor	Fair	Very poor.	Poor	Very poor.	Poor	Good	Good.
EdA, EdB:									
Egan	Good	Good	Good	Good	Poor	Very poor.	Poor	Very poor.	Very poor.
Clarno	Good	Good	Good	Good	Poor	Very poor.	Poor	Very poor.	Very poor.
Trent	Good	Good	Good	Good	Poor	Very poor.	Fair	Very poor.	Very poor.
EeB:									
Egan	Good	Good	Good	Good	Poor	Very poor.	Poor	Very poor.	Very poor.
Ethan	Fair	Fair	Fair	Poor	Poor	Very poor.	Poor	Very poor.	Very poor.
EfB:									
Egan	Good	Good	Good	Good	Poor	Very poor.	Poor	Very poor.	Very poor.
Ethan	Fair	Fair	Fair	Poor	Poor	Very poor.	Poor	Very poor.	Very poor.
Tetonka	Poor	Poor	Fair	Very poor.	Poor	Very poor.	Poor	Good	Good.
EgB:									
Egan	Good	Good	Good	Good	Poor	Very poor.	Poor	Very poor.	Very poor.
Ethan	Fair	Fair	Fair	Poor	Poor	Very poor.	Poor	Very poor.	Very poor.
Trent	Good	Good	Good	Good	Poor	Very poor.	Fair	Very poor.	Very poor.
EhA, EhB:									
Egan	Good	Good	Good	Good	Poor	Very poor.	Poor	Very poor.	Very poor.
Trent	Good	Good	Good	Good	Poor	Very poor.	Fair	Very poor.	Very poor.
Ek:									
Egan	Good	Good	Good	Good	Poor	Very poor.	Poor	Very poor.	Very poor.
Trent	Good	Good	Good	Good	Poor	Very poor.	Fair	Very poor.	Very poor.
Chancellor	Good	Good	Good	Good	Poor	Very poor.	Fair	Poor	Poor.
Em: Enet	Good	Good	Good	Good	Good	Fair	Fair	Very poor.	Very poor.

Table 11.--Wildlife Habitat--Continued

Soil name and map symbol	Grain and seed crops	Grasses and legumes	Native herbaceous plants	Planted woody plants	Native deciduous trees	Native coniferous plants	Native shrubs	Wetland plants	Shallow water areas
	Potential for habitat elements								
EnB:									
Enet	Fair	Fair	Good	Poor	Poor	Very poor.	Poor	Very poor.	Very poor.
Storla	Fair	Fair	Fair	Good	Poor	Very poor.	Fair	Very poor.	Very poor.
Tetonka	Poor	Poor	Fair	Very poor.	Poor	Very poor.	Poor	Good	Good.
EoD:									
Ethan	Very poor.	Very poor.	Fair	Poor	Fair	Poor	Very poor.	Very poor.	Very poor.
Betts	Very poor.	Very poor.	Fair	Poor	Fair	Very poor.	Very poor.	Very poor.	Very poor.
EoE:									
Ethan	Very poor.	Very poor.	Fair	Very poor.	Fair	Poor	Very poor.	Very poor.	Very poor.
Betts	Very poor.	Very poor.	Fair	Very poor.	Fair	Very poor.	Very poor.	Very poor.	Very poor.
EpD:									
Ethan	Very poor.	Very poor.	Fair	Poor	Fair	Poor	Very poor.	Very poor.	Very poor.
Bon	Very poor.	Very poor.	Good	Good	Fair	Very poor.	Fair	Very poor.	Very poor.
EpE:									
Ethan	Very poor.	Very poor.	Fair	Very poor.	Fair	Poor	Very poor.	Very poor.	Very poor.
Bon	Very poor.	Very poor.	Good	Good	Fair	Very poor.	Fair	Very poor.	Very poor.
ErC:									
Ethan	Poor	Fair	Fair	Poor	Poor	Very poor.	Poor	Very poor.	Very poor.
Clarno	Fair	Good	Good	Fair	Fair	Very poor.	Poor	Very poor.	Very poor.
ErD:									
Ethan	Very poor.	Very poor.	Fair	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.
Clarno	Poor	Good	Good	Good	Fair	Poor	Poor	Very poor.	Very poor.
EsB:									
Ethan	Fair	Fair	Fair	Poor	Poor	Very poor.	Poor	Very poor.	Very poor.
Clarno	Good	Good	Good	Good	Poor	Very poor.	Poor	Very poor.	Very poor.
Bon	Good	Good	Good	Good	Poor	Very poor.	Good	Very poor.	Very poor.

Table 11.--Wildlife Habitat--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Native herbaceous plants	Planted woody plants	Native deciduous trees	Native coniferous plants	Native shrubs	Wetland plants	Shallow water areas
EtC:									
Ethan	Poor	Fair	Fair	Poor	Poor	Very poor.	Poor	Very poor.	Very poor.
Clarno	Fair	Good	Good	Fair	Poor	Very poor.	Poor	Very poor.	Very poor.
Bon	Very poor.	Very poor.	Good	Good	Fair	Very poor.	Fair	Very poor.	Very poor.
EuB:									
Ethan	Fair	Fair	Fair	Poor	Poor	Very poor.	Poor	Very poor.	Very poor.
Davison	Fair	Good	Fair	Good	Poor	Very poor.	Fair	Very poor.	Very poor.
Tetonka	Poor	Poor	Fair	Very poor.	Poor	Very poor.	Poor	Good	Good.
EvC:									
Ethan	Poor	Fair	Fair	Poor	Poor	Very poor.	Poor	Very poor.	Very poor.
Egan	Fair	Good	Good	Fair	Poor	Very poor.	Poor	Very poor.	Very poor.
EzE:									
Ethan	Very poor.	Very poor.	Fair	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.
Talmo	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.
Fo: Forney	Good	Good	Good	Good	Fair	Very poor.	Fair	Poor	Poor.
Ga: Grable	Good	Fair	Good	Good	Good	Fair	Good	Very poor.	Very poor.
Gt:									
Grable	Good	Fair	Good	Good	Good	Fair	Good	Very poor.	Very poor.
Ticonic	Fair	Fair	Good	Fair	Good	Fair	Fair	Very poor.	Very poor.
Vore	Good	Fair	Good	Good	Good	Fair	Fair	Very poor.	Very poor.
Gv:									
Grable	Good	Fair	Good	Good	Good	Fair	Good	Very poor.	Very poor.
Vore	Good	Fair	Good	Good	Good	Fair	Fair	Very poor.	Very poor.
Haynie	Good	Good	Good	Good	Good	Fair	Good	Very poor.	Very poor.

Table 11.--Wildlife Habitat--Continued

Soil name and map symbol	Potential for habitat elements								
	Grain and seed crops	Grasses and legumes	Native herba- ceous plants	Planted woody plants	Native decid- uous trees	Native conif- erous plants	Native shrubs	Wetland plants	Shallow water areas
Ha: Haynie	Good	Good	Good	Good	Good	Fair	Good	Very poor.	Very poor.
Hg:									
Haynie	Good	Good	Good	Good	Good	Fair	Good	Very poor.	Very poor.
Grable	Good	Fair	Good	Good	Good	Fair	Good	Very poor.	Very poor.
Hn:									
Haynie	Good	Good	Good	Good	Good	Fair	Good	Very poor.	Very poor.
Lossing	Good	Fair	Good	Good	Fair	Poor	Fair	Very poor.	Very poor.
Grable	Good	Fair	Good	Good	Good	Fair	Good	Very poor.	Very poor.
Ho:									
Haynie	Good	Good	Good	Good	Good	Fair	Good	Very poor.	Very poor.
Onawa	Good	Fair	Good	Good	Fair	Poor	Fair	Very poor.	Very poor.
Blake	Good	Good	Good	Good	Good	Fair	Good	Very poor.	Very poor.
Ja: James	Poor	Poor	Fair	Very poor.	Poor	Poor	Poor	Poor	Poor.
La: Lakeport	Good	Good	Good	Good	Good	Fair	Good	Very poor.	Very poor.
Lb: Lamo	Good	Good	Fair	Good	Good	Fair	Good	Poor	Poor.
Lc: Lamo	Fair	Good	Fair	Good	Good	Fair	Good	Poor	Poor.
Ld:									
Lamo	Good	Good	Fair	Good	Good	Fair	Good	Poor	Poor.
Baltic	Fair	Good	Good	Good	Fair	Very poor.	Fair	Fair	Fair.
Le: Lex	Fair	Good	Fair	Good	Good	Fair	Good	Poor	Poor.
Lg: Lossing	Good	Fair	Good	Good	Fair	Poor	Fair	Very poor.	Very poor.
Lo:									
Lossing	Good	Fair	Good	Good	Fair	Poor	Fair	Very poor.	Very poor.
Owego	Good	Good	Good	Good	Fair	Poor	Fair	Poor	Poor.

Table 11.--Wildlife Habitat--Continued

Soil name and map symbol	Grain and seed crops	Grasses and legumes	Native herbaceous plants	Planted woody plants	Native deciduous trees	Native coniferous plants	Native shrubs	Wetland plants	Shallow water areas
	Potential for habitat elements								
Lr:									
Lossing	Good	Fair	Good	Good	Fair	Poor	Fair	Very poor.	Very poor.
Vore	Good	Fair	Good	Good	Good	Fair	Fair	Very poor.	Very poor.
Lt, Lu: Luton	Poor	Poor	Good	Good	Fair	Very poor.	Fair	Fair	Fair.
McA: Meckling	Poor	Fair	Fair	Good	Good	Fair	Good	Very poor.	Very poor.
Mo: Modale	Good	Good	Good	Good	Good	Fair	Fair	Very poor.	Very poor.
Na:									
Napa	Very poor.	Very poor.	Fair	Very poor.	Poor	Very poor.	Very poor.	Fair	Fair.
Luton	Poor	Poor	Good	Good	Fair	Very poor.	Fair	Fair	Fair.
Nb: Norway	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Fair	Good	Good.
NcA:									
Norway	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Good	Fair	Fair.
Meckling	Poor	Fair	Fair	Good	Good	Fair	Good	Very poor.	Very poor.
Oa: Onawa	Good	Fair	Good	Good	Fair	Poor	Fair	Very poor.	Very poor.
Ob:									
Onawa	Good	Fair	Good	Good	Fair	Poor	Fair	Very poor.	Very poor.
Owego	Good	Good	Good	Good	Fair	Poor	Fair	Poor	Poor.
Oc: Orthents	Very poor.	Very poor.	Very poor.	Very poor.	Fair	Poor	Poor	Poor	Poor.
Og: Orthents	Very poor.	Very poor.	Very poor.	Very poor.	Fair	Very poor.	Very poor.	Fair	Very poor.
Om: Orthents	Very poor.	Very poor.	Fair	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.
Os: Orthents	Very poor.	Very poor.	Very poor.	Very poor.	Fair	Very poor.	Fair	Very poor.	Very poor.
Ow: Owego	Good	Good	Good	Good	Fair	Poor	Fair	Poor	Poor.
Pe: Percival	Good	Fair	Good	Good	Fair	Poor	Fair	Very poor.	Very poor.

Table 11.--Wildlife Habitat--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Native herbaceous plants	Planted woody plants	Native deciduous trees	Native coniferous plants	Native shrubs	Wetland plants	Shallow water areas
Ro: Roxbury	Very poor.	Very poor.	Good	Good	Fair	Poor	Fair	Very poor.	Very poor.
Sa: Salix	Good	Good	Good	Good	Good	Fair	Good	Very poor.	Very poor.
Sd: Salmo	Poor	Poor	Fair	Very poor.	Poor	Very poor.	Very poor.	Poor	Poor.
SeB: Sardak	Very poor.	Very poor.	Fair	Poor	Fair	Poor	Fair	Very poor.	Very poor.
SkB:									
Sardak	Very poor.	Very poor.	Fair	Poor	Fair	Poor	Fair	Very poor.	Very poor.
Scroll	Fair	Fair	Good	Poor	Fair	Poor	Fair	Very poor.	Very poor.
SpA, SpB:									
Scroll	Fair	Fair	Good	Poor	Fair	Poor	Fair	Very poor.	Very poor.
Percival	Good	Fair	Good	Good	Fair	Poor	Fair	Very poor.	Very poor.
TaE:									
Talmo	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.
Thurman	Very poor.	Very poor.	Good	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.
Te: Tetonka	Poor	Poor	Fair	Very poor.	Poor	Very poor.	Poor	Good	Good.
ThA: Thurman	Fair	Fair	Good	Fair	Fair	Fair	Fair	Very poor.	Very poor.
ThB: Thurman	Poor	Fair	Good	Fair	Fair	Fair	Fair	Very poor.	Very poor.
ThC: Thurman	Very poor.	Very poor.	Good	Poor	Fair	Fair	Fair	Very poor.	Very poor.
Tr:									
Ticonic	Fair	Fair	Good	Fair	Good	Fair	Fair	Very poor.	Very poor.
Grable	Good	Fair	Good	Good	Good	Fair	Good	Very poor.	Very poor.
TtA:									
Trent	Good	Good	Good	Good	Poor	Very poor.	Fair	Very poor.	Very poor.
Tetonka	Poor	Poor	Fair	Very poor.	Poor	Very poor.	Poor	Good	Good.
Wakonda	Good	Good	Fair	Good	Poor	Very poor.	Fair	Very poor.	Poor.

Table 11.--Wildlife Habitat--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Native herbaceous plants	Planted woody plants	Native deciduous trees	Native coniferous plants	Native shrubs	Wetland plants	Shallow water areas
TwA:									
Trent	Good	Good	Good	Good	Poor	Very poor.	Fair	Very poor.	Very poor.
Wentworth	Good	Good	Good	Good	Poor	Very poor.	Poor	Very poor.	Very poor.
Wa:									
Wakonda	Good	Good	Fair	Good	Poor	Very poor.	Fair	Very poor.	Poor.
Tetonka	Poor	Poor	Fair	Very poor.	Poor	Very poor.	Poor	Good	Good.
Wc:									
Wakonda	Good	Good	Fair	Good	Poor	Very poor.	Fair	Very poor.	Poor.
Wentworth	Good	Good	Good	Good	Poor	Very poor.	Poor	Very poor.	Very poor.
Whitewood	Good	Good	Good	Good	Poor	Poor	Fair	Poor	Poor.
Wd:									
Wakonda	Good	Good	Fair	Good	Poor	Very poor.	Fair	Very poor.	Poor.
Whitewood	Good	Good	Good	Good	Poor	Poor	Fair	Poor	Poor.
WkB:									
Wentworth	Good	Good	Good	Good	Poor	Very poor.	Poor	Very poor.	Very poor.
Trent	Good	Good	Good	Good	Poor	Very poor.	Fair	Very poor.	Very poor.
Wm: Whitewood	Good	Good	Good	Good	Fair	Poor	Fair	Poor	Poor.
Wo: Worthing	Very poor.	Poor	Poor	Very poor.	Poor	Very poor.	Very poor.	Good	Good.
Wp: Worthing	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good.

Table 12.--Building Site Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Ac: Albaton	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.
Ad: Albaton	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.
AeA: Alcester	Moderate: wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, frost action.
Ba: Baltic	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.
Bb: Blake	Moderate: wetness.	Moderate: flooding.	Moderate: flooding, wetness.	Moderate: flooding.	Severe: low strength, frost action.
Bf: Blencoe	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength, frost action.
Bg: Blyburg	Slight	Moderate: flooding.	Moderate: flooding.	Moderate: flooding.	Severe: frost action.
Bk:					
Blyburg	Slight	Moderate: flooding.	Moderate: flooding.	Moderate: flooding.	Severe: frost action.
Gayville	Severe: wetness.	Moderate: flooding.	Severe: wetness.	Moderate: flooding.	Moderate: low strength, wetness.
Bm: Bon	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: low strength, flooding, frost action.
Bn: Bon	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding, frost action.
Ca:					
Chancellor	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: shrink-swell, low strength.
Tetonka	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.

Table 12.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Cc: Chaska	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding, frost action.
Cd: Clamo	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.
DaA: Dalesburg	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
DbB:					
Dalesburg	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
Dimo	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: low strength, flooding, frost action.
DcA: Davis	Moderate: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, low strength, wetness.
DcB: Davis	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.
DhA:					
Davison	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: frost action.
Chancellor	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: shrink-swell, low strength.
DkA:					
Davison	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: frost action.
Tetonka	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.
Egan	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.
DmB:					
Delmont	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight.
Enet	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight.

Table 12.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
DnD:					
Delmont	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
Talmo	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
Do Dimo	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: low strength, flooding, frost action.
EaA:					
Egan	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.
Chancellor	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: shrink-swell, low strength.
Davison	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: frost action.
EbA:					
Egan	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.
Clarno	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
Chancellor	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: shrink-swell, low strength.
EcA:					
Egan	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.
Clarno	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
Tetonka	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.
EdA:					
Egan	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.
Clarno	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
Trent	Moderate: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action, wetness.

Table 12.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
EdB:					
Egan	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.
Clarno	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.
Trent	Moderate: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action, wetness.
EeB:					
Egan	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.
Ethan	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.
EfB:					
Egan	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.
Ethan	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.
Tetonka	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.
EgB:					
Egan	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.
Ethan	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.
Trent	Moderate: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action, wetness.
EhA:					
Egan	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.
Trent	Moderate: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action, wetness.

Table 12.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
EhB:					
Egan	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.
Trent	Moderate: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action, wetness.
Ek:					
Egan	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.
Trent	Moderate: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action, wetness.
Chancellor	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: shrink-swell, low strength.
Em Enet	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength.
EnB:					
Enet	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight.
Storla	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Severe: frost action.
Tetonka	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.
EoD:					
Ethan	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.
Betts	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.
EoE:					
Ethan	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
Betts	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.

Table 12.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
EpD:					
Ethan	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.
Bon	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding, frost action.
EpE:					
Ethan	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
Bon	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding, frost action.
ErC:					
Ethan	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.
Clarno	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.
ErD:					
Ethan	Moderate: slope.	Moderate: shrink-swell, slope,	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.
Clarno	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.
EsB:					
Ethan	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.
Clarno	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.
Bon	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: low strength, flooding, frost action.
EtC:					
Ethan	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.
Clarno	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.
Bon	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding, frost action.

Table 12.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
EuB:					
Ethan	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.
Davison	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: frost action.
Tetonka	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.
EvC:					
Ethan	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.
Egan	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.
EzE:					
Ethan	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
Talmo	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Fo: Forney	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
Ga: Grable	Severe: cutbanks cave.	Moderate: flooding.	Moderate: flooding.	Moderate: flooding.	Slight.
Gt:					
Grable	Severe: cutbanks cave.	Moderate: flooding.	Moderate: flooding.	Moderate: flooding.	Slight.
Ticonic	Severe: cutbanks cave.	Moderate: flooding.	Moderate: flooding.	Moderate: flooding.	Slight.
Vore	Severe: cutbanks cave.	Moderate: flooding.	Moderate: flooding, wetness.	Moderate: flooding.	Severe: frost action.
Gv:					
Grable	Severe: cutbanks cave.	Moderate: flooding.	Moderate: flooding.	Moderate: flooding.	Slight.
Vore	Severe: cutbanks cave.	Moderate: flooding.	Moderate: flooding, wetness.	Moderate: flooding.	Severe: frost action.
Haynie	Slight	Moderate: flooding.	Moderate: flooding.	Moderate: flooding.	Severe: low strength, frost action.

Table 12.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Ha: Haynie	Slight	Moderate: flooding.	Moderate: flooding.	Moderate: flooding.	Severe: low strength, frost action.
Hg:					
Haynie	Slight	Moderate: flooding.	Moderate: flooding.	Moderate: flooding.	Severe: low strength, frost action.
Grable	Severe: cutbanks cave.	Moderate: flooding.	Moderate: flooding.	Moderate: flooding.	Slight.
Hn:					
Haynie	Slight	Moderate: flooding.	Moderate: flooding.	Moderate: flooding.	Severe: low strength, frost action.
Lossing	Moderate: wetness.	Moderate: flooding.	Moderate: flooding, wetness.	Moderate: flooding.	Severe: low strength, frost action.
Grable	Severe: cutbanks cave.	Moderate: flooding.	Moderate: flooding.	Moderate: flooding.	Slight.
Ho:					
Haynie	Slight	Moderate: flooding.	Moderate: flooding.	Moderate: flooding.	Severe: low strength, frost action.
Onawa	Moderate: wetness.	Moderate: flooding.	Moderate: flooding, wetness.	Moderate: flooding.	Severe: low strength, frost action.
Blake	Moderate: wetness.	Moderate: flooding.	Moderate: flooding, wetness.	Moderate: flooding.	Severe: low strength, frost action.
Ja: James	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.
La: Lakeport	Moderate: wetness.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength, frost action.
Lb: Lamo	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: low strength, flooding, frost action.
Lc: Lamo	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: low strength, flooding, frost action.

Table 12.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Ld:					
Lamo	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: low strength, flooding, frost action.
Baltic	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.
Le: Lex	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding, frost action.
Lg: Lossing	Moderate: wetness.	Moderate: flooding.	Moderate: flooding, wetness.	Moderate: flooding.	Severe: low strength, frost action.
Lo:					
Lossing	Moderate: wetness.	Moderate: flooding.	Moderate: flooding, wetness.	Moderate: flooding.	Severe: low strength, frost action.
Owego	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
Lr:					
Lossing	Moderate: wetness.	Moderate: flooding.	Moderate: flooding, wetness.	Moderate: flooding.	Severe: low strength, frost action.
Vore	Severe: cutbanks cave.	Moderate: flooding.	Moderate: flooding, wetness.	Moderate: flooding.	Severe: frost action.
Lt, Lu: Luton	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.
McA: Meckling	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
Mo: Modale	Moderate: wetness.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
Na:					
Napa	Severe: cutbanks cave, wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.
Luton	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.

Table 12.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Nb: Norway	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding, frost action.
NcA:					
Norway	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding, frost action.
Meckling	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
Oa: Onawa	Moderate: wetness.	Moderate: flooding.	Moderate: flooding, wetness.	Moderate: flooding.	Severe: low strength, frost action.
Ob:					
Onawa	Moderate: wetness.	Moderate: flooding.	Moderate: flooding, wetness.	Moderate: flooding.	Severe: low strength, frost action.
Owego	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
Oc: Orthents	Severe: wetness, slope.	Severe: flooding, wetness, slope.	Severe: flooding, wetness, slope.	Severe: flooding, wetness, slope.	Severe: wetness, slope, flooding.
Og: Orthents	Severe: cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Om: Orthents	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, low strength.
Os: Orthents	Severe: cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Ow: Owego	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
Pe: Percival	Severe: cutbanks cave.	Moderate: flooding.	Moderate: flooding, wetness.	Moderate: flooding.	Moderate: wetness, frost action.
Ro: Roxbury	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding.
Sa: Salix	Moderate: wetness.	Slight	Moderate: wetness.	Slight	Severe: low strength, frost action.
Sd: Salmo	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.

Table 12.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
SeB: Sardak	Severe: cutbanks cave.	Moderate: flooding.	Moderate: flooding.	Moderate: slope, flooding.	Slight.
SkB:					
Sardak	Severe: cutbanks cave.	Moderate: flooding.	Moderate: flooding.	Moderate: flooding, slope.	Slight.
Scroll	Severe: cutbanks cave.	Moderate: flooding.	Moderate: flooding, wetness.	Moderate: flooding.	Moderate: wetness, frost action.
SpA:					
Scroll	Severe: cutbanks cave.	Moderate: flooding.	Moderate: flooding, wetness.	Moderate: flooding.	Moderate: wetness, frost action.
Percival	Severe: cutbanks cave, wetness.	Moderate: flooding.	Moderate: flooding, wetness.	Moderate: flooding.	Moderate: wetness, frost action.
SpB:					
Scroll	Severe: cutbanks cave.	Moderate: flooding.	Moderate: flooding, wetness.	Moderate: slope, flooding.	Moderate: wetness, frost action.
Percival	Severe: cutbanks cave, wetness.	Moderate: flooding.	Moderate: flooding, wetness.	Moderate: slope, flooding.	Moderate: wetness, frost action.
TaE:					
Talmo	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Thurman	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Te: Tetonka	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.
ThA: Thurman	Severe: cutbanks cave.	Slight	Slight	Slight	Slight.
ThB, ThC: Thurman	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight.
Tr:					
Ticonic	Severe: cutbanks cave.	Moderate: flooding.	Moderate: flooding.	Moderate: flooding.	Slight.
Grable	Severe: cutbanks cave.	Moderate: flooding.	Moderate: flooding.	Moderate: flooding.	Slight.

Table 12.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
TtA:					
Trent	Moderate: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action, wetness.
Tetonka	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.
Wakonda	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.
TwA:					
Trent	Moderate: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action, wetness.
Wentworth	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.
Wa:					
Wakonda	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.
Tetonka	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.
Wc:					
Wakonda	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.
Wentworth	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.
Whitewood	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, flooding.
Wd:					
Wakonda	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.
Whitewood	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, flooding.
WkB:					
Wentworth	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.

Table 12.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
WkB:					
Trent	Moderate: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action, wetness.
Wm Whitewood	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, flooding.
Wo, Wp Worthing	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.

Table 13.--Sanitary Facilities

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Ac-------- Albaton	Severe: wetness, percs slowly.	Slight---------	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Ad-------- Albaton	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
AeA-------- Alcester	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
Ba-------- Baltic	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.
Bb-------- Blake	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Fair: wetness.
Bf-------- Blencoe	Severe: wetness, percs slowly.	Moderate: seepage.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
Bg-------- Blyburg	Moderate: percs slowly.	Moderate: seepage.	Slight---------	Slight---------	Good.
Bk:					
Blyburg--------	Moderate: percs slowly.	Moderate: seepage.	Slight---------	Slight---------	Good.
Gayville--------	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, excess sodium.	Severe: wetness.	Poor: excess sodium.
Bm-------- Bon	Moderate: flooding, percs slowly.	Severe: seepage.	Severe: seepage.	Moderate: flooding.	Good.
Bn-------- Bon	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Fair: wetness.
Ca:					
Chancellor--------	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: hard to pack, wetness.
Tetonka--------	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.

Table 13.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Cc------------ Chaska	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: thin layer.
Cd------------ Clamo	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.
DaA----------- Dalesburg	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: too sandy.
DbB:					
Dalesburg-------	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: too sandy.
Dimo----------	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, small stones.
DcA----------- Davis	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
DcB----------- Davis	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight---------	Fair: too clayey.
DhA:					
Davison--------	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Fair: too clayey, wetness.
Chancellor-------	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: hard to pack, wetness.
DkA:					
Davison--------	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Fair: too clayey, wetness.
Tetonka--------	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
Egan----------	Severe: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight---------	Poor: hard to pack.
DmB:					
Delmont--------	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.

Table 13.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
DmB:					
Enet	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
DnD:					
Delmont	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Talmo	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Do: Dimo	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, small stones.
EaA:					
Egan	Severe: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight	Poor: hard to pack.
Chancellor	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: hard to pack, wetness.
Davison	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Fair: too clayey, wetness.
EbA:					
Egan	Severe: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight	Poor: hard to pack.
Clarno	Severe: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
Chancellor	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: hard to pack, wetness.
EcA:					
Egan	Severe: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight	Poor: hard to pack.
Clarno	Severe: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
Tetonka	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.

Table 13.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
EdA:					
Egan	Severe: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight	Poor: hard to pack.
Clarno	Severe: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
Trent	Severe: wetness.	Moderate: seepage.	Severe: wetness.	Severe: wetness.	Fair: too clayey.
EdB:					
Egan	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Poor: hard to pack.
Clarno	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Trent	Severe: wetness.	Moderate: seepage.	Severe: wetness.	Severe: wetness.	Fair: too clayey.
EeB:					
Egan	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Poor: hard to pack.
Ethan	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
EfB:					
Egan	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Poor: hard to pack.
Ethan	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Tetonka	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
EgB:					
Egan	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Poor: hard to pack.
Ethan	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Trent	Severe: wetness.	Moderate: seepage.	Severe: wetness.	Severe: wetness.	Fair: too clayey.
EhA:					
Egan	Severe: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight	Poor: hard to pack.
Trent	Severe: wetness.	Moderate: seepage.	Severe: wetness.	Severe: wetness.	Fair: too clayey.

Table 13.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
EhB:					
Egan	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Poor: hard to pack.
Trent	Severe: wetness.	Moderate: seepage.	Severe: wetness.	Severe: wetness.	Fair: too clayey.
Ek:					
Egan	Severe: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight	Poor: hard to pack.
Trent	Severe: wetness.	Moderate: seepage.	Severe: wetness.	Severe: wetness.	Fair: too clayey.
Chancellor	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: hard to pack, wetness.
Em Enet	Severe: poor filter.	Severe: seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
EnB:					
Enet	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Storla	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Tetonka	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
EoD:					
Ethan	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
Betts	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
EoE:					
Ethan	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Betts	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.

Table 13.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
EpD:					
Ethan	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
Bon	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Fair: wetness.
EpE:					
Ethan	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Bon	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Fair: wetness.
ErC:					
Ethan	Severe: percs slowly.	Severe: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Clarno	Severe: percs slowly.	Severe: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
ErD:					
Ethan	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
Clarno	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
EsB:					
Ethan	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Clarno	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Bon	Moderate: flooding, percs slowly.	Severe: seepage.	Severe: seepage.	Moderate: flooding.	Good.
EtC:					
Ethan	Severe: percs slowly.	Severe: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Clarno	Severe: percs slowly.	Severe: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Bon	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Fair: wetness.

Table 13.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
EuB:					
Ethan	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Davison	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Fair: too clayey, wetness.
Tetonka	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
EvC:					
Ethan	Severe: percs slowly.	Severe: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Egan	Severe: percs slowly.	Severe: slope.	Moderate: too clayey.	Slight	Poor: hard to pack.
EzE:					
Ethan	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Talmo	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
Fo: Forney	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Ga: Grable	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Gt:					
Grable	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Ticonic	Severe: poor filter.	Severe: seepage.	Moderate: too sandy.	Severe: seepage.	Poor: thin layer.
Vore	Severe: wetness, poor filter.	Severe: seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Gv:					
Grable	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Vore	Severe: wetness, poor filter.	Severe: seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: seepage, too sandy.

Table 13.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Gv:					
Haynie	Moderate: percs slowly.	Moderate: seepage.	Slight	Slight	Good.
Ha Haynie	Moderate: percs slowly.	Moderate: seepage.	Slight	Slight	Good.
Hg:					
Haynie	Moderate: percs slowly.	Moderate: seepage.	Slight	Slight	Good.
Grable	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Hn:					
Haynie	Moderate: percs slowly.	Moderate: seepage.	Slight	Slight	Good.
Lossing	Severe: wetness.	Severe: seepage.	Severe: wetness.	Severe: seepage.	Fair: wetness.
Grable	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Ho:					
Haynie	Moderate: percs slowly.	Moderate: seepage.	Slight	Slight	Good.
Onawa	Severe: wetness.	Severe: seepage.	Severe: seepage, wetness.	Severe: seepage.	Fair: wetness.
Blake	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Fair: wetness.
Ja James	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.
La Lakeport	Severe: wetness, percs slowly.	Moderate: wetness.	Severe: wetness, too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
Lb Lamo	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: hard to pack, wetness.
Lc Lamo	Severe: flooding, wetness, percs slowly.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Poor: seepage, too sandy.
Ld:					
Lamo	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: hard to pack, wetness.

Table 13.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Ld:					
Baltic	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.
Le Lex	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.
Lg Lossing	Severe: wetness.	Severe: seepage.	Severe: wetness.	Severe: seepage.	Fair: wetness.
Lo:					
Lossing	Severe: wetness.	Severe: seepage.	Severe: wetness.	Severe: seepage.	Fair: wetness.
Owego	Severe: wetness, percs slowly.	Moderate: seepage.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Lr:					
Lossing	Severe: wetness.	Severe: seepage.	Severe: wetness.	Severe: seepage.	Fair: wetness.
Vore	Severe: wetness, poor filter.	Severe: seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Lt Luton	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.
Lu Luton	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
McA Meckling	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: seepage.
Mo Modale	Severe: wetness, percs slowly.	Moderate: seepage.	Severe: wetness, too clayey.	Moderate: flooding, wetness.	Poor: too clayey, hard to pack.
Na:					
Napa	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey, excess sodium.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Luton	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.

Table 13.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Nb----------------------- Norway	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.
NcA:					
Norway------------------	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.
Meckling----------------	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: seepage.
Oa----------------------- Onawa	Severe: wetness.	Severe: seepage.	Severe: seepage, wetness.	Severe: seepage.	Fair: wetness.
Ob:					
Onawa-------------------	Severe: wetness.	Severe: seepage.	Severe: seepage, wetness.	Severe: seepage.	Fair: wetness.
Owego-------------------	Severe: wetness, percs slowly.	Moderate: seepage.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Oc----------------------- Orthents	Severe: flooding, wetness, percs slowly.	Severe: seepage, flooding, slope.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: too clayey, slope, wetness.
Og----------------------- Orthents	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Om----------------------- Orthents	Severe: percs slowly.	Severe: slope.	Moderate: too clayey.	Slight----------	Fair: too clayey.
Os----------------------- Orthents	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Ow----------------------- Owego	Severe: wetness, percs slowly.	Moderate: seepage.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Pe----------------------- Percival	Severe: wetness, poor filter.	Severe: seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Ro----------------------- Roxbury	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: too clayey, wetness.

Table 13.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Sa---------------------- Salix	Moderate: wetness, percs slowly.	Moderate: seepage.	Moderate: wetness.	Severe: wetness, flooding.	Good.
Sd---------------------- Salmo	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
SeB--------------------- Sardak	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
SkB:					
Sardak-----------------	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Scroll-----------------	Severe: wetness, poor filter.	Severe: seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
SpA, SpB:					
Scroll-----------------	Severe: wetness, poor filter.	Severe: seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Percival---------------	Severe: wetness, poor filter.	Severe: seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
TaE:					
Talmo------------------	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
Thurman----------------	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, slope.
Te---------------------- Tetonka	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
ThA, ThB---------------- Thurman	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
ThC--------------------- Thurman	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.

Table 13.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Tr:					
Ticonic	Severe: poor filter.	Severe: seepage.	Moderate: too sandy.	Severe: seepage.	Poor: thin layer.
Grable	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
TtA:					
Trent	Severe: wetness.	Moderate: seepage.	Severe: wetness.	Severe: wetness.	Fair: too clayey.
Tetonka	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
Wakonda	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
TwA:					
Trent	Severe: wetness.	Moderate: seepage.	Severe: wetness.	Severe: wetness.	Fair: too clayey.
Wentworth	Severe: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
Wa:					
Wakonda	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Tetonka	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
Wc:					
Wakonda	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Wentworth	Severe: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
Whitewood	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: hard to pack, wetness.
Wd:					
Wakonda	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Whitewood	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: hard to pack, wetness.

Table 13.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
WkB:					
Wentworth	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Trent	Severe: wetness.	Moderate: seepage.	Severe: wetness.	Severe: wetness.	Fair: too clayey.
Wm: Whitewood	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: hard to pack, wetness.
Wo, Wp: Worthing	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.

Table 14.--Construction Materials

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Ac, Ad------------------- Albaton	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
AeA--------------------- Alcester	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Ba---------------------- Baltic	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
Bb---------------------- Blake	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Bf---------------------- Blencoe	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Bg---------------------- Blyburg	Good--------------	Improbable: excess fines.	Improbable: excess fines.	Good.
Bk:				
Blyburg-----------------	Good--------------	Improbable: excess fines.	Improbable: excess fines.	Good.
Gayville----------------	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess salt, excess sodium.
Bm---------------------- Bon	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Bn---------------------- Bon	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Ca:				
Chancellor--------------	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Tetonka-----------------	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
Cc---------------------- Chaska	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy, thin layer.
Cd---------------------- Clamo	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.

Table 14.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
DaA--------------------- Dalesburg	Good	Probable	Probable	Fair: too sandy, small stones, thin layer.
DbB:				
Dalesburg	Good	Probable	Probable	Fair: too sandy, small stones, thin layer.
Dimo	Fair: wetness.	Probable	Probable	Poor: small stones, area reclaim.
DcA, DcB Davis	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
DhA:				
Davison	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Chancellor	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
DkA:				
Davison	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Tetonka	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
Egan	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
DmB:				
Delmont	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.
Enet	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.
DnD:				
Delmont	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.
Talmo	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.

Table 14.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Do------------------------ Dimo	Fair: wetness.	Probable----------	Probable----------	Poor: small stones, area reclaim.
EaA:				
Egan--------------------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Chancellor--------------	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Davison-----------------	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
EbA:				
Egan--------------------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Clarno------------------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Chancellor--------------	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
EcA:				
Egan--------------------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Clarno------------------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Tetonka-----------------	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
EdA, EdB:				
Egan--------------------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Clarno------------------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Trent-------------------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
EeB:				
Egan--------------------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Ethan-------------------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.

Table 14.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
EfB:				
Egan	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Ethan	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Tetonka	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
EgB:				
Egan	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Ethan	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Trent	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
EhA, EhB:				
Egan	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Trent	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Ek:				
Egan	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Trent	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Chancellor	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Em Enet	Good	Probable	Improbable: too sandy.	Fair: thin layer.
EnB:				
Enet	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.
Storla	Fair: wetness.	Probable	Probable	Poor: area reclaim.
Tetonka	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.

Table 14.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
EoD:				
Ethan	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, slope.
Betts	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, slope.
EoE:				
Ethan	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Betts	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
EpD:				
Ethan	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, slope.
Bon	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
EpE:				
Ethan	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Bon	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
ErC:				
Ethan	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Clarno	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
ErD:				
Ethan	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, slope.
Clarno	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, slope.
EsB:				
Ethan	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.

Table 14.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
EsB:				
Clarno	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Bon	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
EtC:				
Ethan	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Clarno	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Bon	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
EuB:				
Ethan	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Davison	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Tetonka	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
EvC:				
Ethan	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Egan	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
EzE:				
Ethan	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Talmo	Poor: slope.	Probable	Probable	Poor: too sandy, small stones, area reclaim.
Fo: Forney	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Ga: Grable	Good	Probable	Improbable: too sandy.	Fair: thin layer.

Table 14.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Gt:				
Grable	Good	Probable	Improbable: too sandy.	Fair: thin layer.
Ticonic	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
Vore	Good	Probable	Improbable: too sandy.	Fair: too clayey, thin layer.
Gv:				
Grable	Good	Probable	Improbable: too sandy.	Fair: thin layer.
Vore	Good	Probable	Improbable: too sandy.	Fair: too clayey, thin layer.
Haynie	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Ha Haynie	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Hg:				
Haynie	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Grable	Good	Probable	Improbable: too sandy.	Fair: thin layer.
Hn:				
Haynie	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Lossing	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Grable	Good	Probable	Improbable: too sandy.	Fair: thin layer.
Ho:				
Haynie	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Onawa	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Blake	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Ja James	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, wetness.
La Lakeport	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Lb Lamo	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.

Table 14.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Lc----------------------- Lamo	Fair: wetness.	Probable----------	Improbable: too sandy.	Fair: too clayey, area reclaim.
Ld:				
Lamo--------------------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Baltic------------------	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
Le----------------------- Lex	Fair: wetness.	Probable----------	Probable----------	Fair: too clayey, small stones, area reclaim.
Lg----------------------- Lossing	Good--------------	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Lo:				
Lossing-----------------	Good--------------	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Owego-------------------	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Lr:				
Lossing-----------------	Good--------------	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Vore--------------------	Good--------------	Probable----------	Improbable: too sandy.	Fair: too clayey, thin layer.
Lt, Lu------------------- Luton	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
McA---------------------- Meckling	Fair: wetness.	Probable----------	Improbable: too sandy.	Poor: too sandy.
Mo----------------------- Modale	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
Na:				
Napa--------------------	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, wetness.
Luton-------------------	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
Nb----------------------- Norway	Poor: wetness.	Probable----------	Improbable: too sandy.	Poor: too sandy, wetness.

Table 14.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
NcA:				
Norway	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
Meckling	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
Oa Onawa	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Ob:				
Onawa	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Owego	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Oc Orthents	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness, slope.
Og Orthents	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.
Om Orthents	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Os Orthents	Good	Probable	Improbable: too sandy.	Poor: too sandy.
Ow Owego	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Pe Percival	Fair: thin layer.	Probable	Improbable: too sandy.	Poor: too clayey.
Ro Roxbury	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Sa Salix	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Sd Salmo	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess salt, wetness.
SeB Sardak	Good	Probable	Improbable: too sandy.	Poor: too sandy.
SkB:				
Sardak	Good	Probable	Improbable: too sandy.	Poor: too sandy.
Scroll	Good	Probable	Improbable: too sandy.	Poor: too sandy.

Table 14.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
SpA, SpB:				
Scroll	Good	Probable	Improbable: too sandy.	Poor: too sandy.
Percival	Fair: thin layer.	Probable	Improbable: too sandy.	Poor: too clayey.
TaE:				
Talmo	Poor: slope.	Probable	Probable	Poor: too sandy, small stones, area reclaim.
Thurman	Fair: slope.	Probable	Improbable: too sandy.	Poor: slope.
Te Tetonka	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
ThA, ThB, ThC Thurman	Good	Probable	Improbable: too sandy.	Fair: too sandy, thin layer.
Tr:				
Ticonic	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
Grable	Good	Probable	Improbable: too sandy.	Fair: thin layer.
TtA:				
Trent	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Tetonka	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
Wakonda	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
TwA:				
Trent	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Wentworth	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Wa:				
Wakonda	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Tetonka	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.

Table 14.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Wc:				
Wakonda	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Wentworth	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Whitewood	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Wd:				
Wakonda	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Whitewood	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
WkB:				
Wentworth	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Trent	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Wm: Whitewood	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Wo, Wp: Worthing	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.

Table 15.--Water Management

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable)

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
Ac: Albaton	Slight	Severe: hard to pack, wetness.	Percs slowly	Wetness, slow intake, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.
Ad: Albaton	Slight	Severe: hard to pack, ponding.	Ponding, percs slowly, flooding.	Ponding, slow intake, percs slowly.	Ponding, percs slowly.	Wetness, percs slowly.
AeA: Alcester	Moderate: seepage.	Moderate: piping, wetness.	Deep to water	Favorable	Erodes easily	Erodes easily.
Ba: Baltic	Slight	Severe: hard to pack, wetness.	Percs slowly, flooding, frost action.	Wetness, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
Bb: Blake	Moderate: seepage.	Severe: piping.	Frost action	Favorable	Erodes easily	Erodes easily.
Bf: Blencoe	Moderate: seepage.	Severe: thin layer, wetness.	Percs slowly, frost action.	Wetness, slow intake, percs slowly.	Erodes easily, wetness, percs slowly.	Erodes easily, percs slowly.
Bg: Blyburg	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Erodes easily	Erodes easily.
Bk:						
Blyburg	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Erodes easily	Erodes easily.
Gayville	Moderate: seepage.	Severe: piping, excess sodium.	Percs slowly, excess salt.	Wetness, percs slowly, erodes easily.	Erodes easily, wetness.	Excess sodium, erodes easily, percs slowly.
Bm: Bon	Severe: seepage.	Severe: piping.	Deep to water	Favorable	Favorable	Favorable.
Bn: Bon	Severe: seepage.	Severe: piping.	Deep to water	Flooding	Favorable	Favorable.
Ca:						
Chancellor	Slight	Severe: hard to pack, wetness.	Percs slowly, flooding, frost action.	Wetness, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
Tetonka	Slight	Severe: hard to pack, ponding.	Ponding, percs slowly, frost action.	Ponding, percs slowly, erodes easily.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
Cc: Chaska	Severe: seepage.	Severe: piping, wetness.	Flooding, frost action, cutbanks cave.	Wetness, flooding.	Wetness	Favorable.
Cd: Clamo	Moderate: seepage.	Severe: hard to pack, wetness.	Percs slowly, flooding, frost action.	Wetness, slow intake, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.

Table 15.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
DaA: Dalesburg	Severe: seepage.	Severe: piping.	Deep to water	Favorable	Too sandy	Favorable.
DbB:						
Dalesburg	Severe: seepage.	Severe: piping.	Deep to water	Favorable	Too sandy	Favorable.
Dimo	Severe: seepage.	Severe: seepage, wetness.	Flooding, frost action, cutbanks cave.	Wetness, rooting depth, flooding.	Wetness, too sandy.	Rooting depth.
DcA: Davis	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Favorable	Favorable.
DcB: Davis	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope	Favorable	Favorable.
DhA:						
Davison	Moderate: seepage.	Severe: piping.	Frost action	Wetness, excess salt.	Erodes easily, wetness.	Erodes easily.
Chancellor	Slight	Severe: hard to pack, wetness.	Percs slowly, flooding, frost action.	Wetness, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
DkA:						
Davison	Moderate: seepage.	Severe: piping.	Frost action	Wetness, excess salt.	Erodes easily, wetness.	Erodes easily.
Tetonka	Slight	Severe: hard to pack, ponding.	Ponding, percs slowly, frost action.	Ponding, percs slowly, erodes easily.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
Egan	Moderate: seepage.	Severe: hard to pack.	Deep to water	Favorable	Erodes easily	Erodes easily.
DmB:						
Delmont	Severe: seepage.	Severe: seepage.	Deep to water	Slope, droughty, rooting depth.	Too sandy	Droughty, rooting depth.
Enet	Severe: seepage.	Severe: seepage.	Deep to water	Slope	Too sandy	Favorable.
DnD:						
Delmont	Severe: slope, seepage.	Severe: seepage.	Deep to water	Slope, droughty, rooting depth.	Slope, too sandy.	Slope, droughty, rooting depth.
Talmo	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope, droughty.	Slope, too sandy.	Slope, droughty.
Do: Dimo	Severe: seepage.	Severe: seepage, wetness.	Flooding, frost action, cutbanks cave.	Wetness, rooting depth, flooding.	Wetness, too sandy.	Rooting depth.

Table 15.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
EaA:						
Egan	Moderate: seepage.	Severe: hard to pack.	Deep to water	Favorable	Erodes easily	Erodes easily.
Chancellor	Slight	Severe: hard to pack, wetness.	Percs slowly, flooding, frost action.	Wetness, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
Davison	Moderate: seepage.	Severe: piping.	Frost action	Wetness, excess salt.	Erodes easily, wetness.	Erodes easily.
EbA:						
Egan	Moderate: seepage.	Severe: hard to pack.	Deep to water	Favorable	Erodes easily	Erodes easily.
Clarno	Moderate: seepage.	Moderate: piping.	Deep to water	Favorable	Erodes easily	Erodes easily.
Chancellor	Slight	Severe: hard to pack, wetness.	Percs slowly, flooding, frost action.	Wetness, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
EcA:						
Egan	Moderate: seepage.	Severe: hard to pack.	Deep to water	Favorable	Erodes easily	Erodes easily.
Clarno	Moderate: seepage.	Moderate: piping.	Deep to water	Favorable	Erodes easily	Erodes easily.
Tetonka	Slight	Severe: hard to pack, ponding.	Ponding, percs slowly, frost action.	Ponding, percs slowly, erodes easily.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
EdA:						
Egan	Moderate: seepage.	Severe: hard to pack.	Deep to water	Favorable	Erodes easily	Erodes easily.
Clarno	Moderate: seepage.	Moderate: piping.	Deep to water	Favorable	Erodes easily	Erodes easily.
Trent	Moderate: seepage.	Moderate: piping.	Deep to water	Wetness	Erodes easily	Erodes easily.
EdB:						
Egan	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Slope	Erodes easily	Erodes easily.
Clarno	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope	Erodes easily	Erodes easily.
Trent	Moderate: seepage.	Moderate: piping.	Deep to water	Wetness	Erodes easily	Erodes easily.
EeB:						
Egan	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Slope	Erodes easily	Erodes easily.
Ethan	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope	Erodes easily	Erodes easily.

Table 15.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
EfB:						
Egan	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Slope	Erodes easily	Erodes easily.
Ethan	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope	Erodes easily	Erodes easily.
Tetonka	Slight	Severe: hard to pack, ponding.	Ponding, percs slowly, frost action.	Ponding, percs slowly, erodes easily.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
EgB:						
Egan	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Slope	Erodes easily	Erodes easily.
Ethan	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope	Erodes easily	Erodes easily.
Trent	Moderate: seepage.	Moderate: piping.	Deep to water	Wetness	Erodes easily	Erodes easily.
EhA:						
Egan	Moderate: seepage.	Severe: hard to pack.	Deep to water	Favorable	Erodes easily	Erodes easily.
Trent	Moderate: seepage.	Moderate: piping.	Deep to water	Wetness	Erodes easily	Erodes easily.
EhB:						
Egan	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Slope	Erodes easily	Erodes easily.
Trent	Moderate: seepage.	Moderate: piping.	Deep to water	Wetness	Erodes easily	Erodes easily.
Ek:						
Egan	Moderate: seepage.	Severe: hard to pack.	Deep to water	Favorable	Erodes easily	Erodes easily.
Trent	Moderate: seepage.	Moderate: piping.	Deep to water	Wetness	Erodes easily	Erodes easily.
Chancellor	Slight	Severe: hard to pack, wetness.	Percs slowly, flooding, frost action.	Wetness, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
Em Enet	Severe: seepage.	Severe: seepage, piping.	Deep to water	Favorable	Too sandy	Favorable.
EnB:						
Enet	Severe: seepage.	Severe: seepage.	Deep to water	Slope	Too sandy	Favorable.
Storla	Severe: seepage.	Severe: seepage.	Frost action, cutbanks cave.	Wetness	Wetness, too sandy.	Favorable.

Table 15.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
EnB:						
Tetonka	Slight	Severe: hard to pack, ponding.	Ponding, percs slowly, frost action.	Ponding, percs slowly, erodes easily.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
EoD, EoE:						
Ethan	Severe: slope.	Moderate: piping.	Deep to water	Slope	Erodes easily, slope.	Slope, erodes easily.
Betts	Severe: slope.	Moderate: piping.	Deep to water	Slope, excess salt.	Erodes easily, slope.	Slope, erodes easily.
EpD, EpE:						
Ethan	Severe: slope.	Moderate: piping.	Deep to water	Slope	Erodes easily, slope.	Slope, erodes easily.
Bon	Severe: seepage.	Severe: piping.	Deep to water	Flooding	Favorable	Favorable.
ErC:						
Ethan	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope	Erodes easily	Erodes easily.
Clarno	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope	Erodes easily	Erodes easily.
ErD:						
Ethan	Severe: slope.	Moderate: piping.	Deep to water	Slope	Erodes easily, slope.	Slope, erodes easily.
Clarno	Severe: slope.	Moderate: piping.	Deep to water	Slope	Erodes easily, slope.	Slope, erodes easily.
EsB:						
Ethan	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope	Erodes easily	Erodes easily.
Clarno	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope	Erodes easily	Erodes easily.
Bon	Severe: seepage.	Severe: piping.	Deep to water	Favorable	Favorable	Favorable.
EtC:						
Ethan	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope	Erodes easily	Erodes easily.
Clarno	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope	Erodes easily	Erodes easily.
Bon	Severe: seepage.	Severe: piping.	Deep to water	Flooding	Favorable	Favorable.

Table 15.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
EuB:						
Ethan	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope	Erodes easily	Erodes easily.
Davison	Moderate: seepage, slope.	Severe: piping.	Frost action, slope.	Slope, wetness, excess salt.	Erodes easily, wetness.	Erodes easily.
Tetonka	Slight	Severe: hard to pack, ponding.	Ponding, percs slowly, frost action.	Ponding, percs slowly, erodes easily.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
EvC:						
Ethan	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope	Erodes easily	Erodes easily.
Egan	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Slope	Erodes easily	Erodes easily.
EzE:						
Ethan	Severe: slope.	Moderate: piping.	Deep to water	Slope	Erodes easily, slope.	Slope, erodes easily.
Talmo	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope, droughty.	Slope, too sandy.	Slope, droughty.
Fo Forney	Slight	Severe: hard to pack, wetness.	Percs slowly	Wetness, slow intake, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.
Ga Grable	Severe: seepage.	Severe: seepage, piping.	Deep to water	Favorable	Erodes easily, too sandy.	Erodes easily.
Gt:						
Grable	Severe: seepage.	Severe: seepage, piping.	Deep to water	Favorable	Erodes easily, too sandy.	Erodes easily.
Ticonic	Severe: seepage.	Severe: piping.	Deep to water	Droughty, fast intake, soil blowing.	Soil blowing	Droughty.
Vore	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slow intake, percs slowly.	Too sandy	Percs slowly.
Gv:						
Grable	Severe: seepage.	Severe: seepage, piping.	Deep to water	Favorable	Erodes easily, too sandy.	Erodes easily.
Vore	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slow intake, percs slowly.	Too sandy	Percs slowly.
Haynie	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Erodes easily	Erodes easily.

Table 15.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
Ha-- Haynie	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Erodes easily	Erodes easily.
Hg:						
Haynie	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Erodes easily	Erodes easily.
Grable	Severe: seepage.	Severe: seepage, piping.	Deep to water	Favorable	Erodes easily, too sandy.	Erodes easily.
Hn:						
Haynie	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Erodes easily	Erodes easily.
Lossing	Severe: seepage.	Severe: piping.	Percs slowly, frost action.	Slow intake, percs slowly.	Erodes easily	Erodes easily, percs slowly.
Grable	Severe: seepage.	Severe: seepage, piping.	Deep to water	Favorable	Erodes easily, too sandy.	Erodes easily.
Ho:						
Haynie	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Erodes easily	Erodes easily.
Onawa	Severe: seepage.	Severe: piping.	Percs slowly, frost action.	Slow intake, percs slowly.	Erodes easily	Erodes easily, percs slowly.
Blake	Moderate: seepage.	Severe: piping.	Frost action	Favorable	Erodes easily	Erodes easily.
Ja-- James	Slight	Severe: hard to pack, wetness, excess salt.	Percs slowly, flooding, frost action.	Wetness, droughty, slow intake.	Erodes easily, wetness, percs slowly.	Wetness, excess salt, erodes easily.
La-- Lakeport	Moderate: seepage.	Moderate: hard to pack.	Frost action	Favorable	Erodes easily	Erodes easily.
Lb-- Lamo	Slight	Severe: wetness.	Flooding, frost action.	Wetness, flooding.	Erodes easily, wetness.	Wetness, erodes easily.
Lc-- Lamo	Severe: seepage.	Severe: seepage, wetness.	Flooding, frost action, cutbanks cave.	Wetness, flooding.	Erodes easily, wetness, too sandy.	Erodes easily.
Ld:						
Lamo	Slight	Severe: wetness.	Flooding, frost action.	Wetness, flooding.	Erodes easily, wetness.	Wetness, erodes easily.
Baltic	Slight	Severe: hard to pack, wetness.	Percs slowly, flooding, frost action.	Wetness, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
Le-- Lex	Severe: seepage.	Severe: seepage, piping, wetness.	Flooding, frost action, cutbanks cave.	Wetness, flooding.	Erodes easily, wetness, too sandy.	Wetness, erodes easily.
Lg-- Lossing	Severe: seepage.	Severe: piping.	Percs slowly, frost action.	Slow intake, percs slowly.	Erodes easily	Erodes easily, percs slowly.

Table 15.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
Lo:						
Lossing	Severe: seepage.	Severe: piping.	Percs slowly, frost action.	Slow intake, percs slowly.	Erodes easily	Erodes easily, percs slowly.
Owego	Moderate: seepage.	Severe: hard to pack, wetness.	Percs slowly	Wetness, slow intake, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
Lr:						
Lossing	Severe: seepage.	Severe: piping.	Percs slowly, frost action.	Slow intake, percs slowly.	Erodes easily	Erodes easily, percs slowly.
Vore	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slow intake, percs slowly.	Too sandy	Percs slowly.
Lt Luton	Slight	Severe: hard to pack, wetness.	Percs slowly, flooding.	Wetness, slow intake, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.
Lu Luton	Slight	Severe: hard to pack, wetness.	Percs slowly	Wetness, slow intake, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.
McA Meckling	Severe: seepage.	Severe: seepage, piping.	Cutbanks cave	Droughty	Soil blowing	Droughty.
Mo Modale	Moderate: seepage.	Severe: hard to pack.	Percs slowly, frost action.	Wetness, percs slowly.	Erodes easily, wetness.	Erodes easily, percs slowly.
Na:						
Napa	Slight	Severe: hard to pack, wetness, excess sodium.	Percs slowly, excess salt, excess sodium.	Wetness, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, excess sodium, erodes easily.
Luton	Slight	Severe: hard to pack, wetness.	Percs slowly	Wetness, slow intake, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.
Nb Norway	Severe: seepage.	Severe: seepage, piping, wetness.	Flooding, frost action.	Wetness, droughty.	Wetness, too sandy, soil blowing.	Wetness, droughty.
NcA:						
Norway	Severe: seepage.	Severe: seepage, piping, wetness.	Flooding, frost action, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
Meckling	Severe: seepage.	Severe: seepage, piping.	Cutbanks cave	Droughty	Soil blowing	Droughty.
Oa Onawa	Severe: seepage.	Severe: piping.	Percs slowly, frost action.	Slow intake, percs slowly.	Erodes easily	Erodes easily, percs slowly.

Table 15.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
Ob:						
Onawa	Severe: seepage.	Severe: piping.	Percs slowly, frost action.	Slow intake, percs slowly.	Erodes easily	Erodes easily, percs slowly.
Owego	Moderate: seepage.	Severe: hard to pack, wetness.	Percs slowly	Wetness, slow intake, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
Oc: Orthents	Severe: seepage, slope.	Severe: piping, wetness.	Percs slowly, flooding, slope.	Slope, wetness.	Slope, wetness.	Wetness, slope, percs slowly.
Og: Orthents	Severe: seepage.	Severe: seepage.	Deep to water	Slope, droughty.	Too sandy	Droughty, rooting depth.
Om: Orthents	Moderate: slope.	Severe: piping.	Deep to water	Slope	Erodes easily	Erodes easily.
Os: Orthents	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slope, droughty, fast intake.	Too sandy, soil blowing.	Droughty.
Ow: Owego	Moderate: seepage.	Severe: hard to pack, wetness.	Percs slowly	Wetness, slow intake, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
Pe: Percival	Severe: seepage.	Severe: seepage, piping.	Percs slowly, cutbanks cave.	Droughty, slow intake.	Too sandy	Droughty, percs slowly.
Ro: Roxbury	Moderate: seepage.	Moderate: thin layer, piping.	Deep to water	Flooding	Erodes easily	Erodes easily.
Sa: Salix	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Erodes easily	Erodes easily.
Sd: Salmo	Moderate: seepage.	Severe: wetness.	Flooding, frost action, excess salt.	Wetness, percs slowly, flooding.	Wetness	Wetness, excess salt.
SeB: Sardak	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slope, droughty, fast intake.	Too sandy, soil blowing.	Droughty.
SkB:						
Sardak	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slope, droughty, fast intake.	Too sandy, soil blowing.	Droughty.
Scroll	Severe: seepage.	Severe: seepage, piping.	Percs slowly, cutbanks cave.	Droughty, slow intake.	Erodes easily, too sandy.	Erodes easily, droughty, percs slowly.
SpA:						
Scroll	Severe: seepage.	Severe: seepage, piping.	Percs slowly, cutbanks cave.	Droughty, slow intake.	Erodes easily, too sandy.	Erodes easily, droughty, percs slowly.
Percival	Severe: seepage.	Severe: seepage, piping.	Percs slowly, cutbanks cave.	Droughty, slow intake.	Too sandy	Droughty, percs slowly.

Table 15.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
SpB:						
Scroll	Severe: seepage.	Severe: seepage, piping.	Percs slowly, cutbanks cave, slope.	Droughty, slow intake, slope.	Erodes easily, too sandy.	Erodes easily, droughty, percs slowly.
Percival	Severe: seepage.	Severe: seepage, piping.	Percs slowly, cutbanks cave, slope.	Droughty, slow intake, slope.	Too sandy	Droughty, percs slowly.
TaE:						
Talmo	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope, droughty.	Slope, too sandy.	Slope, droughty.
Thurman	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Slope, droughty, fast intake.	Slope, too sandy, soil blowing.	Slope, droughty, rooting depth.
Te Tetonka	Slight	Severe: hard to pack, ponding.	Ponding, percs slowly, frost action.	Ponding, percs slowly, erodes easily.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
ThA Thurman	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, fast intake.	Too sandy, soil blowing.	Droughty, rooting depth.
ThB, ThC Thurman	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slope, droughty, fast intake.	Too sandy, soil blowing.	Droughty, rooting depth.
Tr:						
Ticonic	Severe: seepage.	Severe: piping.	Deep to water	Droughty, fast intake, soil blowing.	Soil blowing	Droughty.
Grable	Severe: seepage.	Severe: seepage, piping.	Deep to water	Favorable	Erodes easily, too sandy.	Erodes easily.
TtA:						
Trent	Moderate: seepage.	Moderate: piping.	Deep to water	Wetness	Erodes easily	Erodes easily.
Tetonka	Slight	Severe: hard to pack, ponding.	Ponding, percs slowly, frost action.	Ponding, percs slowly, erodes easily.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
Wakonda	Moderate: seepage.	Moderate: piping, wetness.	Frost action	Wetness, excess salt.	Erodes easily, wetness.	Erodes easily.
TwA:						
Trent	Moderate: seepage.	Moderate: piping.	Deep to water	Wetness	Erodes easily	Erodes easily.
Wentworth	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Erodes easily	Erodes easily.

Table 15.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
Wa:						
Wakonda	Moderate: seepage.	Moderate: piping, wetness.	Frost action	Wetness, excess salt.	Erodes easily, wetness.	Erodes easily.
Tetonka	Slight	Severe: hard to pack, ponding.	Ponding, percs slowly, frost action.	Ponding, percs slowly, erodes easily.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
Wc:						
Wakonda	Moderate: seepage.	Moderate: piping, wetness.	Frost action	Wetness, excess salt.	Erodes easily, wetness.	Erodes easily.
Wentworth	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Erodes easily	Erodes easily.
Whitewood	Slight	Severe: wetness.	Flooding, frost action.	Wetness, flooding.	Erodes easily, wetness.	Wetness, erodes easily.
Wd:						
Wakonda	Moderate: seepage.	Moderate: piping, wetness.	Frost action	Wetness, excess salt.	Erodes easily, wetness.	Erodes easily.
Whitewood	Slight	Severe: wetness.	Flooding, frost action.	Wetness, flooding.	Erodes easily, wetness.	Wetness, erodes easily.
WkB:						
Wentworth	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope	Erodes easily	Erodes easily.
Trent	Moderate: seepage.	Moderate: piping.	Deep to water	Wetness	Erodes easily	Erodes easily.
Wm: Whitewood	Slight	Severe: wetness.	Flooding, frost action.	Wetness, flooding.	Erodes easily, wetness.	Wetness, erodes easily.
Wo: Worthing	Slight	Severe: hard to pack, ponding.	Ponding, percs slowly, frost action.	Ponding, percs slowly.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
Wp: Worthing	Slight	Severe: ponding.	Ponding, percs slowly, frost action.	Ponding, percs slowly.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.

Table 16.--Engineering Index Properties

(NP means nonplastic. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
Ac-------------- Albaton	0-9	Silty clay-------	CH	A-7	0	100	100	95-100	95-100	60-85	40-60
	9-60	Silty clay, clay	CH	A-7	0	100	100	95-100	95-100	60-85	40-60
Ad-------------- Albaton	0-60	Silty clay-------	CH	A-7	0	100	100	95-100	95-100	60-85	40-60
AeA------------- Alcester	0-6	Silty clay loam	CL, ML	A-6, A-7	0	100	100	95-100	90-100	35-50	10-25
	6-38	Silty clay loam, silt loam.	CL, ML	A-6, A-7	0	100	100	95-100	90-100	35-50	10-25
	38-60	Silty clay loam, silt loam, clay loam.	ML, CL	A-6, A-7	0	95-100	95-100	85-100	75-100	30-50	10-20
Ba-------------- Baltic	0-18	Silty clay loam	CL, CH	A-7	0	100	100	90-100	85-100	40-65	15-35
	18-45	Silty clay, clay, silty clay loam.	CH, MH	A-7	0	100	95-100	90-100	85-100	50-70	20-40
	45-60	Silty clay, silty clay loam, clay loam.	CL, CH, MH, ML	A-6, A-7	0	100	95-100	80-100	65-100	35-70	15-35
Bb-------------- Blake	0-9	Silty clay loam	CL	A-7, A-6	0	100	100	90-100	85-95	35-50	15-30
	9-25	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	90-100	85-95	30-50	10-30
	25-60	Silt loam, loam, very fine sandy loam.	ML, CL	A-4, A-6	0	100	100	80-90	75-90	30-40	5-15
Bf-------------- Blencoe	0-15	Silty clay-------	CH	A-7	0	100	100	95-100	95-100	60-85	30-50
	15-33	Silty clay loam, silty clay.	CL, CH	A-7	0	100	100	95-100	90-100	41-60	20-30
	33-42	Silt loam, very fine sandy loam, silty clay loam.	ML, CL	A-4, A-6	0	100	100	95-100	85-100	30-40	5-15
	42-80	Silty clay-------	CH	A-7	0	100	100	95-100	95-100	60-85	30-50
Bg-------------- Blyburg	0-18	Silt loam--------	ML, CL-ML	A-4	0	100	100	90-100	70-95	22-35	3-10
	18-60	Silt loam, very fine sandy loam.	ML, CL, CL-ML	A-4, A-6	0	100	100	85-100	50-90	22-35	3-12
Bk:											
Blyburg---------	0-18	Silt loam--------	ML, CL-ML	A-4	0	100	100	90-100	70-95	22-35	3-10
	18-60	Silt loam, very fine sandy loam.	ML, CL, CL-ML	A-4, A-6	0	100	100	85-100	50-90	22-35	3-12
Gayville--------	0-1	Silt loam--------	ML, CL	A-4, A-6	0	100	100	95-100	85-100	25-40	3-15
	1-12	Silty clay loam, silty clay.	CL	A-6, A-7	0	100	100	95-100	85-100	35-50	22-30
	12-18	Silty clay loam	CL	A-4, A-6, A-7	0	100	100	95-100	85-100	30-45	8-20
	18-31	Loam, silt loam, very fine sandy loam.	ML, CL	A-4, A-6	0	100	100	95-100	65-80	25-40	3-15
	31-80	Very fine sandy loam, loam.	ML, CL-ML	A-4	0	100	100	95-100	70-85	15-25	NP-7

Table 16.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
Bm--------------- Bon	0-43	Loam-------------	CL-ML, CL	A-4, A-6	0	100	95-100	80-95	55-85	25-40	5-15
	43-56	Stratified silty clay loam to fine sandy loam.	CL, ML, CL-ML	A-4, A-6	0	100	95-100	80-95	60-85	23-40	3-15
	56-60	Stratified silty clay loam to loamy fine sand.	ML, SM, SC, CL	A-4, A-6, A-7	0	95-100	95-100	75-95	45-95	25-45	3-22
Bn--------------- Bon	0-43	Loam-------------	CL-ML, CL	A-4, A-6	0	100	90-100	80-95	60-85	25-40	5-15
	43-56	Stratified silty clay loam to fine sandy loam.	CL, CL-ML, ML	A-4, A-6	0	100	95-100	80-95	60-85	23-40	3-15
	56-60	Stratified silty clay loam to fine sandy loam.	ML, SM, CL, CL-ML	A-4, A-6, A-7	0	95-100	95-100	75-95	45-95	25-45	3-22
Ca:											
Chancellor------	0-10	Silty clay loam	CL, CH, MH, ML	A-6, A-7	0	100	100	95-100	85-100	35-55	15-25
	10-41	Silty clay, silty clay loam.	CL, CH	A-7	0	100	100	95-100	85-100	40-60	15-30
	41-60	Silty clay loam, clay loam, loam.	CL, CH, ML, MH	A-6, A-7	0	100	100	85-100	70-100	35-55	15-25
Tetonka---------	0-12	Silt loam--------	ML, CL	A-4, A-6, A-7	0	100	100	95-100	80-100	27-50	8-20
	12-20	Silty clay loam, silt loam.	CL	A-6, A-7	0	95-100	95-100	90-100	80-100	30-50	10-25
	20-31	Clay, silty clay, clay loam.	CL, CH, MH, ML	A-7	0	95-100	95-100	85-100	65-100	40-70	15-35
	31-60	Clay loam, silty clay, silty clay loam.	CL, CH	A-6, A-7	0	95-100	95-100	80-100	55-95	30-60	11-30
Cc--------------- Chaska	0-7	Silt loam--------	CL, ML, CL-ML	A-4, A-6	0	100	100	90-100	70-80	30-40	5-15
	7-43	Stratified silt loam to loamy fine sand.	CL, CL-ML	A-4, A-6	0	100	100	85-95	60-75	20-40	5-15
	43-80	Stratified silty clay loam to fine sand.	SM, ML	A-4	0	100	100	85-95	35-75	15-35	NP-7
Cd--------------- Clamo	0-13	Silty clay-------	CL, CH, MH, ML	A-7	0	100	95-100	90-100	85-100	45-75	20-40
	13-23	Silty clay, silty clay loam.	CH, MH	A-7	0	100	95-100	90-100	85-100	50-80	20-45
	23-60	Stratified fine sandy loam to silty clay.	CL, CH	A-6, A-7	0	100	95-100	85-95	60-95	35-60	15-30
DaA-------------- Dalesburg	0-14	Loam-------------	CL, CL-ML	A-4, A-6	0	100	90-100	85-95	60-75	25-40	4-15
	14-34	Sandy loam, fine sandy loam, loamy sand.	SM	A-4, A-2	0	100	90-100	80-95	20-50	20-35	NP-10
	34-62	Fine sand, loamy sand, sand.	SM	A-4, A-2-4	0	90-100	85-100	80-90	20-45	20-30	NP-5
	62-80	Gravelly sand, gravelly loamy sand, very gravelly sand.	SM, SP-SM, SW-SM	A-1, A-2, A-3	0-5	60-90	40-70	20-60	5-30	15-25	NP-5

Table 16.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
DbB:											
Dalesburg-------	0-14	Loam-------------	CL, CL-ML	A-4, A-6	0	100	90-100	85-95	60-75	25-40	4-15
	14-34	Sandy loam, fine sandy loam, loamy sand.	SM	A-4, A-2	0	100	90-100	80-95	20-50	20-35	NP-10
	34-62	Fine sand, loamy sand, sand.	SM	A-4, A-2-4	0	90-100	85-100	80-90	20-45	20-30	NP-5
	62-80	Gravelly sand, gravelly loamy sand, very gravelly sand.	SM, SP-SM, SW-SM	A-1, A-2, A-3	0-5	60-90	40-70	20-60	5-30	15-25	NP-5
Dimo------------	0-12	Clay loam--------	CL	A-6, A-7	0	100	100	85-95	70-85	35-45	12-20
	12-30	Clay loam, loam, sandy clay loam.	CL	A-6, A-7	0	90-100	85-100	85-95	50-80	35-45	12-20
	30-60	Gravelly sand, gravelly loamy sand, gravelly sandy loam.	SM, SP-SM, SW-SM, SC-SM	A-1, A-2, A-3	0-5	60-90	40-70	20-60	5-30	15-25	NP-5
DcA-------------- Davis	0-8	Loam-------------	CL, ML	A-4, A-6, A-7	0	100	90-100	80-100	60-85	30-45	5-20
	8-41	Loam, silt loam, clay loam.	CL, ML	A-4, A-6, A-7	0	100	90-100	80-100	60-85	30-45	5-20
	41-60	Loam, clay loam, silt loam.	CL, ML	A-4, A-6, A-7	0	100	95-100	85-100	55-90	30-45	5-20
DcB-------------- Davis	0-8	Loam-------------	CL, ML	A-6, A-7, A-4	0	100	90-100	80-100	60-85	30-45	5-20
	8-41	Loam, silt loam, clay loam.	CL, ML	A-6, A-7	0	100	90-100	80-100	60-85	35-45	10-20
	41-60	Loam, clay loam, silt loam.	CL	A-6, A-7	0	100	95-100	85-100	55-90	30-45	10-20
DhA:											
Davison---------	0-8	Loam-------------	CL	A-6	0	95-100	95-100	85-95	60-85	25-40	10-20
	8-24	Loam, clay loam, sandy loam.	CL, CL-ML, SC, SC-SM	A-4, A-6	0-5	95-100	95-100	85-100	45-80	25-40	5-20
	24-47	Loam, clay loam	CL-ML, CL	A-4, A-6	0-5	95-100	95-100	85-100	60-80	25-40	5-20
	47-60	Stratified clay loam to sandy loam.	CL-ML, SC, CL, SC-SM	A-4, A-6	0-5	90-100	80-100	65-95	40-75	20-35	5-15
Chancellor------	0-10	Silty clay loam	CL, CH, MH, ML	A-6, A-7	0	100	100	95-100	85-100	35-55	15-25
	10-41	Silty clay, silty clay loam.	CL, CH	A-7	0	100	100	95-100	85-100	40-60	15-30
	41-60	Silty clay loam, clay loam, loam.	CL, CH, ML, MH	A-6, A-7	0	100	100	85-100	70-100	35-55	15-25
DkA:											
Davison---------	0-8	Loam-------------	CL	A-6	0	95-100	95-100	85-95	60-85	25-40	10-20
	8-24	Loam, clay loam, sandy loam.	CL, CL-ML, SC, SC-SM	A-4, A-6	0-5	95-100	95-100	85-100	45-80	25-40	5-20
	24-47	Loam, clay loam	CL-ML, CL	A-4, A-6	0-5	95-100	95-100	85-100	60-80	25-40	5-20
	47-60	Stratified clay loam to sandy loam.	CL-ML, SC, CL, SC-SM	A-4, A-6	0-5	90-100	80-100	65-95	40-75	20-35	5-15

Table 16.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
DkA:											
Tetonka---------	0-12	Silt loam--------	ML, CL	A-4, A-6, A-7	0	100	100	95-100	80-100	27-50	8-20
	12-20	Silty clay loam, silt loam.	CL	A-6, A-7	0	95-100	95-100	90-100	80-100	30-50	10-25
	20-31	Clay, silty clay, clay loam.	CL, CH, MH, ML	A-7	0	95-100	95-100	85-100	65-100	40-70	15-35
	31-60	Clay loam, silty clay, silty clay loam.	CL, CH	A-6, A-7	0	95-100	95-100	80-100	55-95	30-60	11-30
Egan------------	0-8	Silty clay loam	CL, ML	A-6, A-7	0	100	100	95-100	85-100	35-50	10-25
	8-26	Silty clay loam, silt loam.	CL, CH, ML, MH	A-6, A-7	0	100	95-100	90-100	80-100	35-55	10-30
	26-34	Silty clay loam, silt loam.	CL, CH, ML, MH	A-6, A-7	0	100	95-100	90-100	80-100	35-55	10-30
	34-54	Clay loam, loam	CL, CH, ML, MH	A-6, A-7	0-5	95-100	80-100	70-100	60-85	30-55	10-25
	54-60	Clay loam, loam	CL, CH, ML, MH	A-6, A-7	0-5	95-100	80-100	70-100	60-85	30-55	10-25
DmB:											
Delmont---------	0-6	Loam-------------	CL	A-6, A-4	0	90-100	90-100	80-95	60-75	28-40	8-20
	6-18	Loam, fine sandy loam, sandy loam.	SC, CL, CL-ML, SC-SM	A-4, A-6	0	80-100	70-100	50-100	35-70	20-40	5-18
	18-60	Very gravelly sand, gravelly loamy sand, gravelly sand.	SM, SW-SM, SC-SM, SW	A-1, A-2	0-5	60-100	40-80	15-50	3-30	15-25	NP-5
Enet------------	0-6	Loam-------------	ML, CL	A-4, A-6	0	100	100	85-95	55-80	30-40	5-15
	6-26	Loam, clay loam, sandy clay loam.	CL, ML, SC, SM	A-4, A-6	0	90-100	85-100	70-95	45-75	30-40	5-15
	26-60	Gravelly loamy sand, gravelly sand, very gravelly sand.	SW, SW-SM, SM, SC-SM	A-1, A-2, A-3	0	60-95	45-90	10-60	0-15	15-25	NP-5
DnD:											
Delmont---------	0-6	Loam-------------	CL	A-6, A-4	0	90-100	90-100	80-95	60-75	28-40	8-20
	6-18	Loam, fine sandy loam, sandy loam.	SC, CL, CL-ML, SC-SM	A-4, A-6	0	80-100	70-100	50-100	35-70	20-40	5-18
	18-60	Very gravelly sand, gravelly loamy sand, gravelly sand.	SM, SW-SM, SC-SM, SW	A-1, A-2	0-5	60-100	40-80	15-50	3-30	15-25	NP-5
Talmo-----------	0-9	Gravelly loam----	CL, SC	A-4, A-6	0-5	90-100	65-90	35-90	25-80	28-34	9-14
	9-60	Gravelly sand, very gravelly sand, very gravelly loamy sand.	GW, GM, SW, SM	A-2, A-1	0-10	40-95	20-65	15-35	0-35	15-25	NP-5

Table 16.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
Do---------------Dimo	0-12	Clay loam--------	CL	A-6, A-7	0	100	100	85-95	70-85	35-45	12-20
	12-30	Clay loam, loam, sandy clay loam.	CL	A-6, A-7	0	90-100	85-100	85-95	50-80	35-45	12-20
	30-60	Gravelly sand, gravelly loamy sand, gravelly sandy loam.	SM, SP-SM, SW-SM, SC-SM	A-1, A-2, A-3	0-5	60-90	40-70	20-60	5-30	15-25	NP-5
EaA:											
Egan------------	0-8	Silty clay loam	CL, ML	A-6, A-7	0	100	100	95-100	85-100	35-50	10-25
	8-26	Silty clay loam, silt loam.	CL, CH, ML, MH	A-6, A-7	0	100	95-100	90-100	80-100	35-55	10-30
	26-34	Silty clay loam, silt loam.	CL, CH, ML, MH	A-6, A-7	0	100	95-100	90-100	80-100	35-55	10-30
	34-54	Clay loam, loam	CL, CH, ML, MH	A-6, A-7	0-5	95-100	80-100	70-100	60-85	30-55	10-25
	54-60	Clay loam, loam	CL, CH, ML, MH	A-6, A-7	0-5	95-100	80-100	70-100	60-85	30-55	10-25
Chancellor------	0-10	Silty clay loam	CL, CH, MH, ML	A-6, A-7	0	100	100	95-100	85-100	35-55	15-25
	10-41	Silty clay, silty clay loam.	CL, CH	A-7	0	100	100	95-100	85-100	40-60	15-30
	41-60	Silty clay loam, clay loam, loam.	CL, CH, ML, MH	A-6, A-7	0	100	100	85-100	70-100	35-55	15-25
Davison---------	0-8	Loam------------	CL	A-6	0	95-100	95-100	85-95	60-85	25-40	10-20
	8-24	Loam, clay loam, sandy loam.	CL, CL-ML, SC, SC-SM	A-4, A-6	0-5	95-100	95-100	85-100	45-80	25-40	5-20
	24-47	Loam, clay loam	CL-ML, CL	A-4, A-6	0-5	95-100	95-100	85-100	60-80	25-40	5-20
	47-60	Stratified clay loam to sandy loam.	CL-ML, SC, CL, SC-SM	A-4, A-6	0-5	90-100	80-100	65-95	40-75	20-35	5-15
EbA:											
Egan------------	0-8	Silty clay loam	CL, ML	A-6, A-7	0	100	100	95-100	85-100	35-50	10-25
	8-26	Silty clay loam, silt loam.	CL, CH, ML, MH	A-6, A-7	0	100	95-100	90-100	80-100	35-55	10-30
	26-34	Silty clay loam, silt loam.	CL, CH, ML, MH	A-6, A-7	0	100	95-100	90-100	80-100	35-55	10-30
	34-54	Clay loam, loam	CL, CH, ML, MH	A-6, A-7	0-5	95-100	80-100	70-100	60-85	30-55	10-25
	54-60	Clay loam, loam	CL, CH, ML, MH	A-6, A-7	0-5	95-100	80-100	70-100	60-85	30-55	10-25
Clarno----------	0-7	Loam------------	CL, CL-ML	A-4, A-6	0-5	95-100	95-100	85-100	55-85	25-40	5-20
	7-16	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-100	55-85	30-45	10-20
	16-53	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-100	55-85	30-45	10-20
	53-60	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-100	55-85	30-45	10-20
Chancellor------	0-10	Silty clay loam	CL, CH, MH, ML	A-6, A-7	0	100	100	95-100	85-100	35-55	15-25
	10-41	Silty clay, silty clay loam.	CL, CH	A-7	0	100	100	95-100	85-100	40-60	15-30
	41-60	Silty clay loam, clay loam, loam.	CL, CH, ML, MH	A-6, A-7	0	100	100	85-100	70-100	35-55	15-25

Table 16.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
EcA:											
Egan	0-8	Silty clay loam	CL, ML	A-6, A-7	0	100	100	95-100	85-100	35-50	10-25
	8-26	Silty clay loam, silt loam.	CL, CH, ML, MH	A-6, A-7	0	100	95-100	90-100	80-100	35-55	10-30
	26-34	Silty clay loam, silt loam.	CL, CH, ML, MH	A-6, A-7	0	100	95-100	90-100	80-100	35-55	10-30
	34-54	Clay loam, loam	CL, CH, ML, MH	A-6, A-7	0-5	95-100	80-100	70-100	60-85	30-55	10-25
	54-60	Clay loam, loam	CL, CH, ML, MH	A-6, A-7	0-5	95-100	80-100	70-100	60-85	30-55	10-25
Clarno	0-7	Loam	CL, CL-ML	A-4, A-6	0-5	95-100	95-100	85-100	55-85	25-40	5-20
	7-16	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-100	55-85	30-45	10-20
	16-53	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-100	55-85	30-45	10-20
	53-60	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-100	55-85	30-45	10-20
Tetonka	0-12	Silt loam	ML, CL	A-4, A-6, A-7	0	100	100	95-100	80-100	27-50	8-20
	12-20	Silty clay loam, silt loam.	CL	A-6, A-7	0	95-100	95-100	90-100	80-100	30-50	10-25
	20-31	Clay, silty clay, clay loam.	CL, CH, MH, ML	A-7	0	95-100	95-100	85-100	65-100	40-70	15-35
	31-60	Clay loam, silty clay, silty clay loam.	CL, CH	A-6, A-7	0	95-100	95-100	80-100	55-95	30-60	11-30
EdA, EdB:											
Egan	0-8	Silty clay loam	CL, ML	A-6, A-7	0	100	100	95-100	85-100	35-50	10-25
	8-26	Silty clay loam, silt loam.	CL, CH, ML, MH	A-6, A-7	0	100	95-100	90-100	80-100	35-55	10-30
	26-34	Silty clay loam, silt loam.	CL, CH, ML, MH	A-6, A-7	0	100	95-100	90-100	80-100	35-55	10-30
	34-54	Clay loam, loam	CL, CH, ML, MH	A-6, A-7	0-5	95-100	80-100	70-100	60-85	30-55	10-25
	54-60	Clay loam, loam	CL, CH, ML, MH	A-6, A-7	0-5	95-100	80-100	70-100	60-85	30-55	10-25
Clarno	0-7	Loam	CL, CL-ML	A-4, A-6	0-5	95-100	95-100	85-100	55-85	25-40	5-20
	7-16	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-100	55-85	30-45	10-20
	16-53	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-100	55-85	30-45	10-20
	53-60	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-100	55-85	30-45	10-20
Trent	0-17	Silty clay loam	CL, CH, ML, MH	A-6, A-7	0	100	100	95-100	90-100	35-55	10-30
	17-28	Silty clay loam	CL, CH	A-6, A-7	0	100	95-100	90-100	80-100	35-55	15-30
	28-47	Silt loam, silty clay loam.	CL	A-6, A-7, A-4	0	100	95-100	90-100	80-100	30-50	8-25
	47-52	Silt loam, silty clay loam.	CL, ML	A-6, A-7, A-4	0	100	90-100	85-100	70-100	30-50	8-20
	52-60	Silt loam, silty clay loam.	CL	A-6, A-7, A-4	0	100	90-100	85-100	70-100	30-45	8-20

Table 16.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
EeB:											
Egan------------	0-8	Silty clay loam	CL, ML	A-6, A-7	0	100	100	95-100	85-100	35-50	10-25
	8-26	Silty clay loam, silt loam.	CL, CH, ML, MH	A-6, A-7	0	100	95-100	90-100	80-100	35-55	10-30
	26-34	Silty clay loam, silt loam.	CL, CH, ML, MH	A-6, A-7	0	100	95-100	90-100	80-100	35-55	10-30
	34-54	Clay loam, loam	CL, CH, ML, MH	A-6, A-7	0-5	95-100	80-100	70-100	60-85	30-55	10-25
	54-60	Clay loam, loam	CL, CH, ML, MH	A-6, A-7	0-5	95-100	80-100	70-100	60-85	30-55	10-25
Ethan-----------	0-8	Loam-------------	CL, CL-ML	A-4, A-6	0-5	95-100	90-100	85-100	55-85	25-40	5-20
	8-51	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-100	55-80	30-50	10-25
	51-60	Loam, clay loam	CL	A-4, A-6, A-7	0-5	90-100	85-100	75-100	50-95	28-45	8-20
EfB:											
Egan------------	0-8	Silty clay loam	CL, ML	A-6, A-7	0	100	100	95-100	85-100	35-50	10-25
	8-26	Silty clay loam, silt loam.	CL, CH, ML, MH	A-6, A-7	0	100	95-100	90-100	80-100	35-55	10-30
	26-34	Silty clay loam, silt loam.	CL, CH, ML, MH	A-6, A-7	0	100	95-100	90-100	80-100	35-55	10-30
	34-54	Clay loam, loam	CL, CH, ML, MH	A-6, A-7	0-5	95-100	80-100	70-100	60-85	30-55	10-25
	54-60	Clay loam, loam	CL, CH, ML, MH	A-6, A-7	0-5	95-100	80-100	70-100	60-85	30-55	10-25
Ethan-----------	0-8	Loam-------------	CL, CL-ML	A-4, A-6	0-5	95-100	90-100	85-100	55-85	25-40	5-20
	8-51	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-100	55-80	30-50	10-25
	51-60	Loam, clay loam	CL	A-4, A-6, A-7	0-5	90-100	85-100	75-100	50-95	28-45	8-20
Tetonka---------	0-12	Silt loam--------	ML, CL	A-4, A-6, A-7	0	100	100	95-100	80-100	27-50	8-20
	12-20	Silty clay loam, silt loam.	CL	A-6, A-7	0	95-100	95-100	90-100	80-100	30-50	10-25
	20-31	Clay, silty clay, clay loam.	CL, CH, MH, ML	A-7	0	95-100	95-100	85-100	65-100	40-70	15-35
	31-60	Clay loam, silty clay, silty clay loam.	CL, CH	A-6, A-7	0	95-100	95-100	80-100	55-95	30-60	11-30
EgB:											
Egan------------	0-8	Silty clay loam	CL, ML	A-6, A-7	0	100	100	95-100	85-100	35-50	10-25
	8-26	Silty clay loam, silt loam.	CL, CH, ML, MH	A-6, A-7	0	100	95-100	90-100	80-100	35-55	10-30
	26-34	Silty clay loam, silt loam.	CL, CH, ML, MH	A-6, A-7	0	100	95-100	90-100	80-100	35-55	10-30
	34-54	Clay loam, loam	CL, CH, ML, MH	A-6, A-7	0-5	95-100	80-100	70-100	60-85	30-55	10-25
	54-60	Clay loam, loam	CL, CH, ML, MH	A-6, A-7	0-5	95-100	80-100	70-100	60-85	30-55	10-25
Ethan-----------	0-8	Loam-------------	CL, CL-ML	A-4, A-6	0-5	95-100	90-100	85-100	55-85	25-40	5-20
	8-51	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-100	55-80	30-50	10-25
	51-60	Loam, clay loam	CL	A-4, A-6, A-7	0-5	90-100	85-100	75-100	50-95	28-45	8-20

Table 16.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
EgB:											
Trent-----------	0-17	Silty clay loam	CL, CH, ML, MH	A-6, A-7	0	100	100	95-100	90-100	35-55	10-30
	17-28	Silty clay loam	CL, CH	A-6, A-7	0	100	95-100	90-100	80-100	35-55	15-30
	28-47	Silt loam, silty clay loam.	CL	A-6, A-7, A-4	0	100	95-100	90-100	80-100	30-50	8-25
	47-52	Silt loam, silty clay loam.	CL, ML	A-6, A-7, A-4	0	100	90-100	85-100	70-100	30-50	8-20
	52-60	Silt loam, silty clay loam.	CL	A-6, A-7, A-4	0	100	90-100	85-100	70-100	30-45	8-20
EhA, EhB:											
Egan------------	0-8	Silty clay loam	CL, ML	A-6, A-7	0	100	100	95-100	85-100	35-50	10-25
	8-26	Silty clay loam, silt loam.	CL, CH, ML, MH	A-6, A-7	0	100	95-100	90-100	80-100	35-55	10-30
	26-34	Silty clay loam, silt loam.	CL, CH, ML, MH	A-6, A-7	0	100	95-100	90-100	80-100	35-55	10-30
	34-54	Clay loam, loam	CL, CH, ML, MH	A-6, A-7	0-5	95-100	80-100	70-100	60-85	30-55	10-25
	54-60	Clay loam, loam	CL, CH, ML, MH	A-6, A-7	0-5	95-100	80-100	70-100	60-85	30-55	10-25
Trent-----------	0-17	Silty clay loam	CL, CH, ML, MH	A-6, A-7	0	100	100	95-100	90-100	35-55	10-30
	17-28	Silty clay loam	CL, CH	A-6, A-7	0	100	95-100	90-100	80-100	35-55	15-30
	28-47	Silt loam, silty clay loam.	CL	A-6, A-7, A-4	0	100	95-100	90-100	80-100	30-50	8-25
	47-52	Silt loam, silty clay loam.	CL, ML	A-6, A-7, A-4	0	100	90-100	85-100	70-100	30-50	8-20
	52-60	Silt loam, silty clay loam.	CL	A-6, A-7, A-4	0	100	90-100	85-100	70-100	30-45	8-20
Ek:											
Egan------------	0-8	Silty clay loam	CL, ML	A-6, A-7	0	100	100	95-100	85-100	35-50	10-25
	8-26	Silty clay loam, silt loam.	CL, CH, ML, MH	A-6, A-7	0	100	95-100	90-100	80-100	35-55	10-30
	26-34	Silty clay loam, silt loam.	CL, CH, ML, MH	A-6, A-7	0	100	95-100	90-100	80-100	35-55	10-30
	34-54	Clay loam, loam	CL, CH, ML, MH	A-6, A-7	0-5	95-100	80-100	70-100	60-85	30-55	10-25
	54-60	Clay loam, loam	CL, CH, ML, MH	A-6, A-7	0-5	95-100	80-100	70-100	60-85	30-55	10-25
Trent-----------	0-17	Silty clay loam	CL, CH, ML, MH	A-6, A-7	0	100	100	95-100	90-100	35-55	10-30
	17-28	Silty clay loam	CL, CH	A-6, A-7	0	100	95-100	90-100	80-100	35-55	15-30
	28-47	Silt loam, silty clay loam.	CL	A-6, A-7, A-4	0	100	95-100	90-100	80-100	30-50	8-25
	47-52	Silt loam, silty clay loam.	CL, ML	A-6, A-7, A-4	0	100	90-100	85-100	70-100	30-50	8-20
	52-60	Silt loam, silty clay loam.	CL	A-6, A-7, A-4	0	100	90-100	85-100	70-100	30-45	8-20
Chancellor------	0-10	Silty clay loam	CL, CH, MH, ML	A-6, A-7	0	100	100	95-100	85-100	35-55	15-25
	10-41	Silty clay, silty clay loam.	CL, CH	A-7	0	100	100	95-100	85-100	40-60	15-30
	41-60	Silty clay loam, clay loam, loam.	CL, CH, ML, MH	A-6, A-7	0	100	100	85-100	70-100	35-55	15-25

Table 16.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
Em----------------- Enet	0-12	Loam-------------	ML, CL, CL-ML	A-4, A-6	0	100	100	80-95	80-95	20-40	3-20
	12-23	Loam, silt loam	ML, CL, CL-ML	A-4, A-6	0	100	100	80-95	80-95	20-40	3-20
	23-31	Loam, silt loam, very fine sandy loam.	ML, CL, CL-ML	A-4, A-6	0	100	100	80-95	70-90	20-40	3-20
	31-80	Loamy fine sand, fine sand, loamy sand.	SM, SC-SM, SP-SM	A-2, A-3	0	100	100	65-80	5-35	15-20	NP-5
EnB:											
Enet-------------	0-6	Loam-------------	ML, CL	A-4, A-6	0	100	100	85-95	55-80	30-40	5-15
	6-26	Loam, clay loam, sandy clay loam.	CL, ML, SC, SM	A-4, A-6	0	90-100	85-100	70-95	45-75	30-40	5-15
	26-60	Gravelly loamy sand, gravelly sand, very gravelly sand.	SW, SW-SM, SM, SC-SM	A-1, A-2, A-3	0	60-95	45-90	10-60	0-15	15-25	NP-5
Storla-----------	0-9	Loam-------------	CL, ML	A-4, A-6	0	100	95-100	75-95	60-95	30-40	5-15
	9-25	Loam, fine sandy loam, sandy loam.	CL, SC, CL-ML, SC-SM	A-4, A-6	0	95-100	85-100	60-95	35-80	25-40	5-20
	25-60	Loamy sand, gravelly sand, gravelly loamy sand.	SM, SW-SM, SP-SM	A-1, A-2, A-3	0-5	60-90	45-70	20-60	5-30	15-25	NP-5
Tetonka----------	0-12	Silt loam--------	ML, CL	A-4, A-6, A-7	0	100	100	95-100	80-100	27-50	8-20
	12-20	Silty clay loam, silt loam.	CL	A-6, A-7	0	95-100	95-100	90-100	80-100	30-50	10-25
	20-31	Clay, silty clay, clay loam.	CL, CH, MH, ML	A-7	0	95-100	95-100	85-100	65-100	40-70	15-35
	31-60	Clay loam, silty clay, silty clay loam.	CL, CH	A-6, A-7	0	95-100	95-100	80-100	55-95	30-60	11-30
EoD, EoE:											
Ethan------------	0-8	Loam-------------	CL, CL-ML	A-4, A-6	0-5	95-100	90-100	85-100	55-85	25-40	5-20
	8-51	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-100	55-80	30-50	10-25
	51-60	Loam, clay loam	CL	A-4, A-6, A-7	0-5	90-100	85-100	75-100	50-95	28-45	8-20
Betts------------	0-4	Loam-------------	CL	A-6	0-5	90-100	80-100	75-100	60-75	30-40	10-20
	4-41	Loam, clay loam	CL	A-6, A-7	0-5	90-100	85-100	75-100	50-85	30-45	10-25
	41-60	Clay loam, loam	CL	A-6, A-7	0-5	90-100	85-100	75-100	50-85	30-45	10-25
EpD, EpE:											
Ethan------------	0-8	Loam-------------	CL, CL-ML	A-4, A-6	0-5	95-100	90-100	85-100	55-85	25-40	5-20
	8-51	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-100	55-80	30-50	10-25
	51-60	Loam, clay loam	CL	A-4, A-6, A-7	0-5	90-100	85-100	75-100	50-95	28-45	8-20
Bon--------------	0-43	Loam-------------	CL-ML, CL	A-4, A-6	0	100	90-100	80-95	60-85	25-40	5-15
	43-56	Stratified silty clay loam to fine sandy loam.	CL, CL-ML, ML	A-4, A-6	0	100	95-100	80-95	60-85	23-40	3-15
	56-60	Stratified silty clay loam to fine sandy loam.	ML, SM, CL, CL-ML	A-4, A-6, A-7	0	95-100	95-100	75-95	45-95	25-45	3-22

Table 16.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
ErC, ErD:											
Ethan	0-8	Loam	CL, CL-ML	A-4, A-6	0-5	95-100	90-100	85-100	55-85	25-40	5-20
	8-51	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-100	55-80	30-50	10-25
	51-60	Loam, clay loam	CL	A-4, A-6, A-7	0-5	90-100	85-100	75-100	50-95	28-45	8-20
Clarno	0-7	Loam	CL, CL-ML	A-4, A-6	0-5	95-100	95-100	85-100	55-85	25-40	5-20
	7-16	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-100	55-85	30-45	10-20
	16-53	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-100	55-85	30-45	10-20
	53-60	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-100	55-85	30-45	10-20
EsB:											
Ethan	0-8	Loam	CL, CL-ML	A-4, A-6	0-5	95-100	90-100	85-100	55-85	25-40	5-20
	8-51	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-100	55-80	30-50	10-25
	51-60	Loam, clay loam	CL	A-4, A-6, A-7	0-5	90-100	85-100	75-100	50-95	28-45	8-20
Clarno	0-7	Loam	CL, CL-ML	A-4, A-6	0-5	95-100	95-100	85-100	55-85	25-40	5-20
	7-16	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-100	55-85	30-45	10-20
	16-53	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-100	55-85	30-45	10-20
	53-60	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-100	55-85	30-45	10-20
Bon	0-43	Loam	CL-ML, CL	A-4, A-6	0	100	95-100	80-95	55-85	25-40	5-15
	43-56	Stratified silty clay loam to fine sandy loam.	CL, ML, CL-ML	A-4, A-6	0	100	95-100	80-95	60-85	23-40	3-15
	56-60	Stratified silty clay loam to loamy fine sand.	ML, SM, SC, CL	A-4, A-6, A-7	0	95-100	95-100	75-95	45-95	25-45	3-22
EtC:											
Ethan	0-8	Loam	CL, CL-ML	A-4, A-6	0-5	95-100	90-100	85-100	55-85	25-40	5-20
	8-51	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-100	55-80	30-50	10-25
	51-60	Loam, clay loam	CL	A-4, A-6, A-7	0-5	90-100	85-100	75-100	50-95	28-45	8-20
Clarno	0-7	Loam	CL, CL-ML	A-4, A-6	0-5	95-100	95-100	85-100	55-85	25-40	5-20
	7-16	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-100	55-85	30-45	10-20
	16-53	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-100	55-85	30-45	10-20
	53-60	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-100	55-85	30-45	10-20
Bon	0-43	Loam	CL-ML, CL	A-4, A-6	0	100	90-100	80-95	60-85	25-40	5-15
	43-56	Stratified silty clay loam to fine sandy loam.	CL, CL-ML, ML	A-4, A-6	0	100	95-100	80-95	60-85	23-40	3-15
	56-60	Stratified silty clay loam to fine sandy loam.	ML, SM, CL, CL-ML	A-4, A-6, A-7	0	95-100	95-100	75-95	45-95	25-45	3-22
EuB:											
Ethan	0-8	Loam	CL, CL-ML	A-4, A-6	0-5	95-100	90-100	85-100	55-85	25-40	5-20
	8-51	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-100	55-80	30-50	10-25
	51-60	Loam, clay loam	CL	A-4, A-6, A-7	0-5	90-100	85-100	75-100	50-95	28-45	8-20

Table 16.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
EuB:											
Davison	0-8	Loam	CL	A-6	0	95-100	95-100	85-95	60-85	25-40	10-20
	8-24	Loam, clay loam, sandy loam.	CL, CL-ML, SC, SC-SM	A-4, A-6	0-5	95-100	95-100	85-100	45-80	25-40	5-20
	24-47	Loam, clay loam	CL-ML, CL	A-4, A-6	0-5	95-100	95-100	85-100	60-80	25-40	5-20
	47-60	Stratified clay loam to sandy loam.	CL-ML, SC, CL, SC-SM	A-4, A-6	0-5	90-100	80-100	65-95	40-75	20-35	5-15
Tetonka	0-12	Silt loam	ML, CL	A-4, A-6, A-7	0	100	100	95-100	80-100	27-50	8-20
	12-20	Silty clay loam, silt loam.	CL	A-6, A-7	0	95-100	95-100	90-100	80-100	30-50	10-25
	20-31	Clay, silty clay, clay loam.	CL, CH, MH, ML	A-7	0	95-100	95-100	85-100	65-100	40-70	15-35
	31-60	Clay loam, silty clay, silty clay loam.	CL, CH	A-6, A-7	0	95-100	95-100	80-100	55-95	30-60	11-30
EvC:											
Ethan	0-8	Loam	CL, CL-ML	A-4, A-6	0-5	95-100	90-100	85-100	55-85	25-40	5-20
	8-51	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-100	55-80	30-50	10-25
	51-60	Loam, clay loam	CL	A-4, A-6, A-7	0-5	90-100	85-100	75-100	50-95	28-45	8-20
Egan	0-8	Silty clay loam	CL, ML	A-6, A-7	0	100	100	95-100	85-100	35-50	10-25
	8-26	Silty clay loam, silt loam.	CL, CH, ML, MH	A-6, A-7	0	100	95-100	90-100	80-100	35-55	10-30
	26-34	Silty clay loam, silt loam.	CL, CH, ML, MH	A-6, A-7	0	100	95-100	90-100	80-100	35-55	10-30
	34-54	Clay loam, loam	CL, CH, ML, MH	A-6, A-7	0-5	95-100	80-100	70-100	60-85	30-55	10-25
	54-60	Clay loam, loam	CL, CH, ML, MH	A-6, A-7	0-5	95-100	80-100	70-100	60-85	30-55	10-25
EzE:											
Ethan	0-8	Loam	CL, CL-ML	A-4, A-6	0-5	95-100	90-100	85-100	55-85	25-40	5-20
	8-51	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-100	55-80	30-50	10-25
	51-60	Loam, clay loam	CL	A-4, A-6, A-7	0-5	90-100	85-100	75-100	50-95	28-45	8-20
Talmo	0-9	Gravelly loam	CL, SC	A-4, A-6	0-5	90-100	65-90	35-90	25-80	28-34	9-14
	9-60	Gravelly sand, very gravelly sand, very gravelly loamy sand.	GW, GM, SW, SM	A-2, A-1	0-10	40-95	20-65	15-35	0-35	15-25	NP-5
Fo: Forney	0-16	Silty clay	CH	A-7	0	100	100	95-100	95-100	60-85	35-55
	16-60	Silty clay, clay	CH	A-7	0	100	100	95-100	95-100	60-85	35-55
Ga: Grable	0-8	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	80-95	80-95	25-40	5-20
	8-26	Silt loam, very fine sandy loam.	CL, CL-ML	A-4, A-6	0	100	100	80-95	80-95	0-25	5-15
	26-60	Fine sand, loamy sand, sand.	SM, SC-SM, SP-SM	A-2, A-3	0	100	100	65-80	5-35	0-20	NP-5

Table 16.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
Gt:											
Grable	0-8	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	80-95	80-95	25-40	5-20
	8-26	Silt loam, very fine sandy loam.	CL, CL-ML	A-4, A-6	0	100	100	80-95	80-95	0-25	5-15
	26-60	Fine sand, loamy sand, sand.	SM, SC-SM, SP-SM	A-2, A-3	0	100	100	65-80	5-35	0-20	NP-5
Ticonic	0-9	Loamy fine sand	SM	A-2-4	0	100	100	60-80	15-35	---	NP
	9-26	Stratified sand to loamy fine sand.	SM, SP-SM, SP	A-2-4, A-3	0	100	95-100	60-80	2-15	---	NP
	26-50	Stratified loamy fine sand to silt loam.	ML, CL-ML	A-6, A-4	0	100	85-95	80-90	60-80	25-40	5-12
	50-80	Stratified loam to fine sand.	SM, SC-SM, SC	A-4, A-2-4	0	100	95-100	55-95	25-45	20-30	2-8
Vore	0-8	Silty clay	CH	A-7	0	100	100	95-100	95-100	60-80	30-50
	8-23	Silty clay loam	CL	A-7, A-6	0	100	100	95-100	90-100	35-50	15-25
	23-60	Fine sand, loamy fine sand.	SW-SM, SP-SM, SM, SC-SM	A-3, A-2-4	0	100	100	80-90	5-20	0-20	NP-5
Gv:											
Grable	0-8	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	80-95	80-95	25-40	5-20
	8-26	Silt loam, very fine sandy loam.	CL, CL-ML	A-4, A-6	0	100	100	80-95	80-95	0-25	5-15
	26-60	Fine sand, loamy sand, sand.	SM, SC-SM, SP-SM	A-2, A-3	0	100	100	65-80	5-35	0-20	NP-5
Vore	0-8	Silty clay	CH	A-7	0	100	100	95-100	95-100	60-80	30-50
	8-23	Silty clay loam	CL	A-7, A-6	0	100	100	95-100	90-100	35-50	15-25
	23-60	Fine sand, loamy fine sand.	SW-SM, SP-SM, SM, SC-SM	A-3, A-2-4	0	100	100	80-90	5-20	0-20	NP-5
Haynie	0-9	Silt loam	CL-ML, CL	A-4, A-6	0	100	100	85-100	70-100	25-40	5-15
	9-60	Silt loam, very fine sandy loam.	CL-ML, CL	A-4, A-6	0	100	100	85-100	85-100	25-35	5-15
Ha Haynie	0-9	Silt loam	CL-ML, CL	A-4, A-6	0	100	100	85-100	70-100	25-40	5-15
	9-60	Silt loam, very fine sandy loam.	CL-ML, CL	A-4, A-6	0	100	100	85-100	85-100	25-35	5-15
Hg:											
Haynie	0-9	Silt loam	CL-ML, CL	A-4, A-6	0	100	100	85-100	70-100	25-40	5-15
	9-60	Silt loam, very fine sandy loam.	CL-ML, CL	A-4, A-6	0	100	100	85-100	85-100	25-35	5-15
Grable	0-8	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	80-95	80-95	25-40	5-20
	8-26	Silt loam, very fine sandy loam.	CL, CL-ML	A-4, A-6	0	100	100	80-95	80-95	0-25	5-15
	26-60	Fine sand, loamy sand, sand.	SM, SC-SM, SP-SM	A-2, A-3	0	100	100	65-80	5-35	0-20	NP-5
Hn:											
Haynie	0-9	Silt loam	CL-ML, CL	A-4, A-6	0	100	100	85-100	70-100	25-40	5-15
	9-60	Silt loam, very fine sandy loam.	CL-ML, CL	A-4, A-6	0	100	100	85-100	85-100	25-35	5-15

Table 16.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
Hn:											
Lossing	0-8	Silty clay	CH	A-7	0	100	100	95-100	95-100	60-85	30-55
	8-13	Silty clay	CH	A-7	0	100	100	95-100	95-100	60-85	30-55
	13-18	Silty clay loam	CL	A-7, A-6	0	100	100	95-100	95-100	35-50	15-30
	18-72	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	95-100	80-100	25-40	5-20
	72-80	Silty clay	CH	A-7	0	100	100	95-100	95-100	60-85	30-55
Grable	0-8	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	80-95	80-95	25-40	5-20
	8-26	Silt loam, very fine sandy loam.	CL, CL-ML	A-4, A-6	0	100	100	80-95	80-95	0-25	5-15
	26-60	Fine sand, loamy sand, sand.	SM, SC-SM, SP-SM	A-2, A-3	0	100	100	65-80	5-35	0-20	NP-5
Ho:											
Haynie	0-9	Silt loam	CL-ML, CL	A-4, A-6	0	100	100	85-100	70-100	25-40	5-15
	9-60	Silt loam, very fine sandy loam.	CL-ML, CL	A-4, A-6	0	100	100	85-100	85-100	25-35	5-15
Onawa	0-7	Silty clay	CH	A-7	0	100	100	95-100	95-100	60-85	40-60
	7-25	Silty clay, clay	CH	A-7	0	100	100	95-100	95-100	60-85	40-60
	25-60	Silt loam, very fine sandy loam, loam.	CL, CL-ML	A-4, A-6	0	100	100	95-100	85-100	25-40	5-20
Blake	0-9	Silty clay loam	CL	A-7, A-6	0	100	100	90-100	85-95	35-50	15-30
	9-25	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	90-100	85-95	30-50	10-30
	25-60	Silt loam, loam, very fine sandy loam.	ML, CL	A-4, A-6	0	100	100	80-90	75-90	30-40	5-15
Ja James	0-16	Silty clay	CH, MH	A-7	0	100	100	90-100	85-100	60-90	25-55
	16-60	Silty clay, clay, silty clay loam.	CH, MH	A-7	0	100	100	90-100	85-100	60-90	25-55
La Lakeport	0-12	Silty clay loam	CL, CH	A-7	0	100	100	95-100	90-100	40-60	20-35
	12-22	Silty clay loam	CL, CH	A-7	0	100	100	95-100	90-100	40-60	20-35
	22-38	Silty clay, silty clay loam.	CL, CH	A-7	0	100	100	95-100	90-100	40-60	20-35
	38-60	Silt loam, loam, very fine sandy loam.	CL	A-6	0	100	100	90-100	85-95	25-40	10-20
Lb Lamo	0-10	Silty clay loam	CL, CH	A-7, A-6, A-4	0	100	100	95-100	80-95	25-55	8-25
	10-60	Silty clay loam, silt loam.	CL, CH	A-7, A-6	0	100	100	95-100	85-95	30-55	11-25
Lc Lamo	0-10	Silty clay loam	CL, CH	A-7	0	100	100	95-100	85-95	40-65	20-35
	10-39	Silty clay loam, clay loam, loam.	CL, CH	A-6, A-7	0	100	100	95-100	85-95	30-65	10-35
	39-47	Sandy clay loam	CL, CH	A-7	0	100	95-100	85-100	80-100	40-60	15-35
	47-60	Gravelly sand, fine sand, sand.	SP, SP-SM	A-1	0	90-100	70-100	10-28	0-15	15-20	NP-5
Ld:											
Lamo	0-10	Silty clay loam	CL, CH	A-7, A-6, A-4	0	100	100	95-100	80-95	25-55	8-25
	10-60	Silty clay loam, silt loam.	CL, CH	A-7, A-6	0	100	100	95-100	85-95	30-55	11-25

Table 16.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
Ld:											
Baltic	0-18	Silty clay loam	CL, CH	A-7	0	100	100	90-100	85-100	40-65	15-35
	18-45	Silty clay, clay, silty clay loam.	CH, MH	A-7	0	100	95-100	90-100	85-100	50-70	20-40
	45-60	Silty clay, silty clay loam, clay loam.	CL, CH, MH, ML	A-6, A-7	0	100	95-100	80-100	65-100	35-70	15-35
Le	0-12	Clay loam	CL	A-6, A-7	0	95-100	95-100	95-100	85-95	30-50	15-30
Lex	12-32	Stratified sandy loam to silty clay loam.	CL, ML, CL-ML	A-6, A-4, A-7	0	95-100	95-100	85-100	60-90	20-45	3-25
	32-60	Gravelly sand, coarse sand, gravelly loamy sand.	SP, SP-SM, SM	A-2, A-1, A-3	0	60-100	50-95	30-65	3-14	15-20	NP-5
Lg	0-8	Silty clay	CH	A-7	0	100	100	95-100	95-100	60-85	30-55
Lossing	8-13	Silty clay	CH	A-7	0	100	100	95-100	95-100	60-85	30-55
	13-18	Silty clay loam	CL	A-7, A-6	0	100	100	99-100	95-100	35-50	15-30
	18-72	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	95-100	80-100	25-40	5-20
	72-80	Silty clay	CH	A-7	0	100	100	95-100	95-100	60-85	30-55
Lo:											
Lossing	0-8	Silty clay	CH	A-7	0	100	100	95-100	95-100	60-85	30-55
	8-13	Silty clay	CH	A-7	0	100	100	95-100	95-100	60-85	30-55
	13-18	Silty clay loam	CL	A-7, A-6	0	100	100	99-100	95-100	35-50	15-30
	18-72	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	95-100	80-100	25-40	5-20
	72-80	Silty clay	CH	A-7	0	100	100	95-100	95-100	60-85	30-55
Owego	0-16	Silty clay	CH	A-7	0	100	100	95-100	95-100	60-85	30-55
	16-24	Silt loam, silty clay loam, clay loam.	CL, CL-ML	A-4, A-6	0	100	100	95-100	90-100	25-40	5-15
	24-60	Silty clay, clay	CH	A-7	0	100	100	95-100	95-100	60-85	30-55
Lr:											
Lossing	0-8	Silty clay	CH	A-7	0	100	100	95-100	95-100	60-85	30-55
	8-13	Silty clay	CH	A-7	0	100	100	95-100	95-100	60-85	30-55
	13-18	Silty clay loam	CL	A-7, A-6	0	100	100	99-100	95-100	35-50	15-30
	18-72	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	95-100	80-100	25-40	5-20
	72-80	Silty clay	CH	A-7	0	100	100	95-100	95-100	60-85	30-55
Vore	0-8	Silty clay	CH	A-7	0	100	100	95-100	95-100	60-80	30-50
	8-23	Silty clay loam	CL	A-7, A-6	0	100	100	95-100	90-100	35-50	15-25
	23-60	Fine sand, loamy fine sand.	SW-SM, SP-SM, SM, SC-SM	A-3, A-2-4	0	100	100	80-90	5-20	0-20	NP-5
Lt, Lu	0-16	Silty clay	CH	A-7	0	100	100	95-100	95-100	60-85	35-60
Luton	16-26	Silty clay, clay	CH	A-7	0	100	100	95-100	95-100	60-85	35-60
	26-60	Silty clay	CH	A-7	0	100	100	95-100	95-100	60-85	35-60
McA	0-6	Loamy fine sand	SP-SM, SM	A-2, A-3, A-4	0	100	100	85-95	5-50	0-30	NP-5
Meckling											
	6-54	Stratified fine sand to loamy fine sand.	SM, SP-SM, SC-SM	A-2, A-3	0	100	100	70-90	5-30	0-25	NP-5
	54-80	Stratified sand to very fine sand.	SM, SP-SM, SC-SM	A-2, A-3	0	100	100	70-90	5-30	0-25	NP-5

Table 16.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
Mo------ Modale	0-25	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	95-100	80-90	25-40	5-15
	25-60	Silty clay, clay	CH	A-7	0	100	100	95-100	95-100	65-85	40-60
Na:											
Napa------	0-1	Silt loam--------	ML, CL	A-4, A-6	0	100	100	100	90-100	30-40	5-15
	1-33	Silty clay, clay	CH, MH	A-7	0	100	100	95-100	90-100	50-80	20-45
	33-80	Silty clay, clay, silty clay loam.	CL, CH, MH, ML	A-7	0	100	100	95-100	90-100	40-75	15-40
Luton------	0-16	Silty clay-------	CH	A-7	0	100	100	95-100	95-100	60-85	35-60
	16-26	Silty clay, clay	CH	A-7	0	100	100	95-100	95-100	60-85	35-60
	26-60	Silty clay-------	CH	A-7	0	100	100	95-100	95-100	60-85	35-60
Nb------ Norway	0-2	Loamy fine sand	SM	A-2-4	0	100	100	60-80	15-35	---	NP
	2-80	Stratified sand to loamy fine sand.	SM, SP, SP-SM	A-2-4, A-3	0	100	100	60-80	2-35	---	NP
NcA:											
Norway------	0-2	Loamy fine sand	SM	A-2-4	0	100	100	60-95	15-35	---	NP
	2-80	Stratified sand to loamy fine sand.	SM, SP, SP-SM	A-2-4, A-3	0	100	100	60-95	2-35	---	NP
Meckling------	0-6	Loamy fine sand	SP-SM, SM	A-2, A-3, A-4	0	100	100	85-95	5-50	0-30	NP-5
	6-54	Stratified fine sand to loamy fine sand.	SM, SP-SM, SC-SM	A-2, A-3	0	100	100	70-90	5-30	0-25	NP-5
	54-80	Stratified sand to very fine sand.	SM, SP-SM, SC-SM	A-2, A-3	0	100	100	70-90	5-30	0-25	NP-5
Oa------ Onawa	0-7	Silty clay-------	CH	A-7	0	100	100	95-100	95-100	60-85	40-60
	7-25	Silty clay, clay	CH	A-7	0	100	100	95-100	95-100	60-85	40-60
	25-60	Silt loam, very fine sandy loam.	CL, CL-ML	A-4, A-6	0	100	100	95-100	85-100	25-40	5-20
Ob:											
Onawa------	0-7	Silty clay-------	CH	A-7	0	100	100	95-100	95-100	60-85	40-60
	7-25	Silty clay, clay	CH	A-7	0	100	100	95-100	95-100	60-85	40-60
	25-60	Silt loam, very fine sandy loam.	CL, CL-ML	A-4, A-6	0	100	100	95-100	85-100	25-40	5-20
Owego------	0-16	Silty clay-------	CH	A-7	0	100	100	95-100	95-100	60-85	30-55
	16-24	Silt loam, silty clay loam, clay loam.	CL, CL-ML	A-4, A-6	0	100	100	95-100	90-100	25-40	5-15
	24-60	Silty clay, clay	CH	A-7	0	100	100	95-100	95-100	60-85	30-55
Oc------ Orthents	0-10	Silty clay loam	CL, CH, MH, ML	A-7	0	100	95-100	90-100	85-100	45-75	20-40
	10-80	Stratified silty clay to fine sandy loam.	ML, SM, CL	A-4, A-6, A-7	0	95-100	95-100	75-95	45-95	25-45	3-22
Og------ Orthents	0-10	Gravelly loam----	SM, GM	A-4, A-2	0-5	60-90	50-80	45-70	25-50	20-35	NP-7
	10-60	Gravelly loamy sand, gravelly sand, very gravelly sand.	SW, SW-SM, SM	A-1	0-10	60-85	45-70	15-45	0-15	15-25	NP-5

Table 16.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
Om---------------- Orthents	0-8	Silty clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-95	75-95	30-45	10-25
	8-60	Loam, silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0-5	90-100	85-100	75-100	55-90	25-40	5-20
Os---------------- Orthents	0-10	Loamy fine sand	SM, SP-SM	A-2, A-3, A-4	0	100	100	90-100	5-40	15-20	NP-5
	10-80	Stratified sand to very fine sandy loam.	SM, SP-SM	A-2, A-3, A-4	0	100	100	50-100	5-50	10-20	NP-7
Ow---------------- Owego	0-16	Silty clay-------	CH	A-7	0	100	100	95-100	95-100	60-85	30-55
	16-24	Silt loam, silty clay loam, clay loam.	CL, CL-ML	A-4, A-6	0	100	100	95-100	90-100	25-40	5-15
	24-60	Silty clay, clay	CH	A-7	0	100	100	95-100	95-100	60-85	30-55
Pe---------------- Percival	0-7	Silty clay-------	CH	A-7	0	100	100	95-100	95-100	60-85	35-60
	7-25	Silty clay, clay	CH	A-7	0	100	100	95-100	95-100	60-85	35-60
	25-60	Stratified fine sand to loamy fine sand.	SM, SC-SM, SP-SM	A-2	0	100	100	80-95	12-30	0-20	NP-5
Ro---------------- Roxbury	0-12	Silt loam--------	CL	A-6	0	100	100	90-100	70-90	30-35	10-15
	12-24	Silt loam, silty clay loam, loam.	CL	A-6, A-7-6	0	100	100	95-100	85-100	30-45	10-20
	24-60	Silt loam, silty clay loam, loam.	CL	---	0	100	100	85-100	65-95	30-45	10-20
Sa---------------- Salix	0-15	Silty clay loam	CL, CH	A-7	0	100	100	95-100	95-100	40-60	20-35
	15-24	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	95-100	35-50	20-30
	24-60	Silt loam, loam, very fine sandy loam.	CL, ML	A-4, A-6	0	100	100	95-100	90-100	30-40	5-15
Sd---------------- Salmo	0-24	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	85-95	30-50	10-25
	24-47	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	95-100	85-95	30-45	10-20
	47-60	Silty clay loam, silty clay, clay loam.	CL, CH	A-7	0	100	95-100	90-100	75-95	40-60	15-35
SeB--------------- Sardak	0-6	Loamy fine sand	SM	A-2-4	0	100	100	60-80	15-35	---	NP
	6-60	Fine sand, loamy fine sand, sand.	SM, SP, SP-SM	A-2-4, A-3	0	100	100	60-80	2-35	---	NP
SkB:											
Sardak----------	0-6	Loamy fine sand	SM	A-2-4	0	100	100	60-80	15-35	---	NP
	6-60	Fine sand, loamy fine sand, sand.	SM, SP, SP-SM	A-2-4, A-3	0	100	100	60-80	2-35	---	NP
Scroll----------	0-8	Silty clay-------	CH	A-7	0	100	100	95-100	95-100	60-85	35-60
	8-11	Silt loam, silty clay loam.	CL, ML	A-6, A-4, A-5	0	100	100	95-100	95-100	25-50	8-20
	11-60	Loamy fine sand, sand, fine sand.	SM, SW-SM, SC-SM	A-3, A-2-4, A-4	0	100	100	80-95	25-45	0-20	NP-5

Table 16.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
SpA, SpB:											
Scroll----------	0-8	Silty clay-------	CH	A-7	0	100	100	95-100	95-100	60-85	35-60
	8-11	Silt loam, silty clay loam.	CL, ML	A-6, A-4, A-5	0	100	100	95-100	95-100	25-50	8-20
	11-60	Loamy fine sand, sand, fine sand.	SM, SW-SM, SC-SM	A-3, A-2-4, A-4	0	100	100	80-95	25-45	0-20	NP-5
Percival--------	0-7	Silty clay-------	CH	A-7	0	100	100	95-100	95-100	60-85	35-60
	7-25	Silty clay, clay	CH	A-7	0	100	100	95-100	95-100	60-85	35-60
	25-60	Stratified fine sand to loamy fine sand.	SM, SC-SM, SP-SM	A-2	0	100	100	80-95	12-30	0-20	NP-5
TaE:											
Talmo-----------	0-9	Gravelly loam----	CL, SC	A-4, A-6	0-5	90-100	65-90	35-90	25-80	28-34	9-14
	9-60	Gravelly sand, very gravelly sand, very gravelly loamy sand.	GW, GM, SW, SM	A-2, A-1	0-10	40-95	20-65	15-35	0-35	15-25	NP-5
Thurman---------	0-19	Loamy fine sand	SM, SP-SM	A-2, A-3, A-4	0	100	100	90-100	5-40	15-20	NP-5
	19-36	Loamy fine sand, loamy sand.	SM, SP-SM	A-2, A-3, A-4	0	100	100	90-100	5-40	15-20	NP-5
	36-60	Fine sand, sand, very fine sand.	SP-SM, SM	A-3, A-2	0	100	100	50-95	5-35	15-20	NP-5
Te--------------- Tetonka	0-12	Silt loam--------	ML, CL	A-4, A-6, A-7	0	100	100	95-100	80-100	27-50	8-20
	12-20	Silty clay loam, silt loam.	CL	A-6, A-7	0	95-100	95-100	90-100	80-100	30-50	10-25
	20-31	Clay, silty clay, clay loam.	CL, CH, MH, ML	A-7	0	95-100	95-100	85-100	65-100	40-70	15-35
	31-60	Clay loam, silty clay, silty clay loam.	CL, CH	A-6, A-7	0	95-100	95-100	80-100	55-95	30-60	11-30
ThA, ThB, ThC---- Thurman	0-19	Loamy fine sand	SM, SP-SM	A-2, A-3, A-4	0	100	100	90-100	5-40	15-20	NP-5
	19-36	Loamy fine sand, loamy sand.	SM, SP-SM	A-2, A-3, A-4	0	100	100	90-100	5-40	15-20	NP-5
	36-60	Fine sand, sand, very fine sand.	SP-SM, SM	A-3, A-2	0	100	100	50-95	5-35	15-20	NP-5
Tr:											
Ticonic---------	0-9	Loamy fine sand	SM	A-2-4	0	100	100	60-80	15-35	---	NP
	9-26	Stratified sand to loamy fine sand.	SM, SP-SM, SP	A-2-4, A-3	0	100	95-100	60-80	2-15	---	NP
	26-50	Stratified loamy fine sand to silt loam.	ML, CL-ML	A-6, A-4	0	100	85-95	80-90	60-80	25-40	5-12
	50-80	Stratified loam to fine sand.	SM, SC-SM, SC	A-4, A-2-4	0	100	95-100	55-95	25-45	20-30	2-8
Grable----------	0-8	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	80-95	80-95	25-40	5-20
	8-26	Silt loam, very fine sandy loam.	CL, CL-ML	A-4, A-6	0	100	100	80-95	80-95	0-25	5-15
	26-60	Fine sand, loamy sand, sand.	SM, SC-SM, SP-SM	A-2, A-3	0	100	100	65-80	5-35	0-20	NP-5

Table 16.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
TtA:											
Trent-----------	0-17	Silty clay loam	CL, CH, ML, MH	A-6, A-7	0	100	100	95-100	90-100	35-55	10-30
	17-28	Silty clay loam	CL, CH	A-6, A-7	0	100	95-100	90-100	80-100	35-55	15-30
	28-47	Silt loam, silty clay loam.	CL	A-6, A-7, A-4	0	100	95-100	90-100	80-100	30-50	8-25
	47-52	Silt loam, silty clay loam.	CL, ML	A-6, A-7, A-4	0	100	90-100	85-100	70-100	30-50	8-20
	52-60	Silt loam, silty clay loam.	CL	A-6, A-7, A-4	0	100	90-100	85-100	70-100	30-45	8-20
Tetonka---------	0-12	Silt loam--------	ML, CL	A-4, A-6, A-7	0	100	100	95-100	80-100	27-50	8-20
	12-20	Silty clay loam, silt loam.	CL	A-6, A-7	0	95-100	95-100	90-100	80-100	30-50	10-25
	20-31	Clay, silty clay, clay loam.	CL, CH, MH, ML	A-7	0	95-100	95-100	85-100	65-100	40-70	15-35
	31-60	Clay loam, silty clay, silty clay loam.	CL, CH	A-6, A-7	0	95-100	95-100	80-100	55-95	30-60	11-30
Wakonda---------	0-9	Silt loam--------	CL	A-6, A-7	0	100	100	90-100	85-100	30-50	10-25
	9-35	Silt loam, silty clay loam.	CL	A-6, A-7	0	95-100	95-100	90-100	85-100	30-50	10-25
	35-62	Silt loam, silty clay loam, loam.	CL	A-6, A-7	0	95-100	95-100	85-95	60-90	30-50	10-25
	62-80	Clay loam, loam	CL	A-6, A-7	0-5	95-100	90-100	85-100	55-85	30-50	10-25
TwA:											
Trent-----------	0-17	Silty clay loam	CL, CH, ML, MH	A-6, A-7	0	100	100	95-100	90-100	35-55	10-30
	17-28	Silty clay loam	CL, CH	A-6, A-7	0	100	95-100	90-100	80-100	35-55	15-30
	28-47	Silt loam, silty clay loam.	CL	A-6, A-7, A-4	0	100	95-100	90-100	80-100	30-50	8-25
	47-52	Silt loam, silty clay loam.	CL, ML	A-6, A-7, A-4	0	100	90-100	85-100	70-100	30-50	8-20
	52-60	Silt loam, silty clay loam.	CL	A-6, A-7, A-4	0	100	90-100	85-100	70-100	30-45	8-20
Wentworth-------	0-7	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	85-100	35-50	11-25
	7-31	Silty clay loam, silt loam.	CL, CH, MH, ML	A-6, A-7	0	100	100	95-100	80-100	35-55	10-30
	31-49	Silty clay loam, silt loam.	CL, ML	A-4, A-6, A-7	0	100	95-100	85-100	60-100	30-50	5-25
	49-60	Clay loam, loam	CL	A-6, A-7	0-5	95-100	90-100	85-100	55-85	30-50	10-25
Wa:											
Wakonda---------	0-9	Silt loam--------	CL	A-6, A-7	0	100	100	90-100	85-100	30-50	10-25
	9-35	Silt loam, silty clay loam.	CL	A-6, A-7	0	95-100	95-100	90-100	85-100	30-50	10-25
	35-62	Silt loam, silty clay loam, loam.	CL	A-6, A-7	0	95-100	95-100	85-95	60-90	30-50	10-25
	62-80	Clay loam, loam	CL	A-6, A-7	0-5	95-100	90-100	85-100	55-85	30-50	10-25

Table 16.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
Wa:											
Tetonka	0-12	Silt loam	ML, CL	A-4, A-6, A-7	0	100	100	95-100	80-100	27-50	8-20
	12-20	Silty clay loam, silt loam.	CL	A-6, A-7	0	95-100	95-100	90-100	80-100	30-50	10-25
	20-31	Clay, silty clay, clay loam.	CL, CH, MH, ML	A-7	0	95-100	95-100	85-100	65-100	40-70	15-35
	31-60	Clay loam, silty clay, silty clay loam.	CL, CH	A-6, A-7	0	95-100	95-100	80-100	55-95	30-60	11-30
Wc:											
Wakonda	0-9	Silt loam	CL	A-6, A-7	0	100	100	90-100	85-100	30-50	10-25
	9-35	Silt loam, silty clay loam.	CL	A-6, A-7	0	95-100	95-100	90-100	85-100	30-50	10-25
	35-62	Silt loam, silty clay loam, loam.	CL	A-6, A-7	0	95-100	95-100	85-95	60-90	30-50	10-25
	62-80	Clay loam, loam	CL	A-6, A-7	0-5	95-100	90-100	85-100	55-85	30-50	10-25
Wentworth	0-7	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	85-100	35-50	11-25
	7-31	Silty clay loam, silt loam.	CL, CH, MH, ML	A-6, A-7	0	100	100	95-100	80-100	35-55	10-30
	31-49	Silty clay loam, silt loam.	CL, ML	A-4, A-6, A-7	0	100	95-100	85-100	60-100	30-50	5-25
	49-60	Clay loam, loam	CL	A-6, A-7	0-5	95-100	90-100	85-100	55-85	30-50	10-25
Whitewood	0-14	Silty clay loam	ML, CL	A-6, A-7	0	100	100	95-100	85-100	30-50	10-20
	14-32	Silty clay loam, silt loam.	CL, CH	A-6, A-7	0	100	100	95-100	80-100	35-55	15-30
	32-48	Silty clay loam, silt loam.	CL, CH	A-6, A-7	0	100	100	95-100	80-95	35-55	15-30
	48-60	Silty clay loam, clay loam, silt loam.	CL, CH	A-6, A-7	0	100	95-100	90-100	75-95	35-55	15-30
Wd:											
Wakonda	0-9	Silt loam	CL	A-6, A-7	0	100	100	90-100	85-100	30-50	10-25
	9-35	Silt loam, silty clay loam.	CL	A-6, A-7	0	95-100	95-100	90-100	85-100	30-50	10-25
	35-62	Silt loam, silty clay loam, loam.	CL	A-6, A-7	0	95-100	95-100	85-95	60-90	30-50	10-25
	62-80	Clay loam, loam	CL	A-6, A-7	0-5	95-100	90-100	85-100	55-85	30-50	10-25
Whitewood	0-14	Silty clay loam	ML, CL	A-6, A-7	0	100	100	95-100	85-100	30-50	10-20
	14-32	Silty clay loam, silt loam.	CL, CH	A-6, A-7	0	100	100	95-100	80-100	35-55	15-30
	32-48	Silty clay loam, silt loam.	CL, CH	A-6, A-7	0	100	100	95-100	80-95	35-55	15-30
	48-60	Silty clay loam, clay loam, silt loam.	CL, CH	A-6, A-7	0	100	95-100	90-100	75-95	35-55	15-30
WkB:											
Wentworth	0-7	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	85-100	35-50	11-25
	7-31	Silty clay loam, silt loam.	CL, CH, MH, ML	A-6, A-7	0	100	100	95-100	80-100	35-55	10-30
	31-49	Silty clay loam, silt loam.	CL, ML	A-4, A-6, A-7	0	100	95-100	85-100	60-100	30-50	5-25
	49-60	Clay loam, loam	CL	A-6, A-7	0-5	95-100	90-100	85-100	55-85	30-50	10-25

Table 16.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
WkB:											
Trent	0-17	Silty clay loam	CL, CH, ML, MH	A-6, A-7	0	100	100	95-100	90-100	35-55	10-30
	17-28	Silty clay loam	CL, CH	A-6, A-7	0	100	95-100	90-100	80-100	35-55	15-30
	28-47	Silt loam, silty clay loam.	CL	A-6, A-7, A-4	0	100	95-100	90-100	80-100	30-50	8-25
	47-52	Silt loam, silty clay loam.	CL, ML	A-6, A-7, A-4	0	100	90-100	85-100	70-100	30-50	8-20
	52-60	Silt loam, silty clay loam.	CL	A-6, A-7, A-4	0	100	90-100	85-100	70-100	30-45	8-20
Wm Whitewood	0-14	Silty clay loam	ML, CL	A-6, A-7	0	100	100	95-100	85-100	30-50	10-20
	14-32	Silty clay loam, silt loam.	CL, CH	A-6, A-7	0	100	100	95-100	80-100	35-55	15-30
	32-48	Silty clay loam, silt loam.	CL, CH	A-6, A-7	0	100	100	95-100	80-95	35-55	15-30
	48-60	Silty clay loam, clay loam, silt loam.	CL, CH	A-6, A-7	0	100	95-100	90-100	75-95	35-55	15-30
Wo Worthing	0-18	Silty clay loam	CL, CH	A-7	0	100	100	95-100	85-100	40-60	15-30
	18-53	Silty clay, clay	CH, MH	A-7	0	100	100	95-100	85-100	50-70	22-35
	53-60	Silty clay, silty clay loam, clay loam.	CL, CH, ML, MH	A-7	0	100	95-100	90-100	70-100	40-65	15-30
Wp Worthing	0-18	Silty clay loam	CL, CH	A-7	0	100	100	95-100	85-100	40-60	15-30
	18-53	Silty clay, clay	CH	A-7	0	100	100	95-100	80-100	50-70	25-40
	53-60	Silty clay, silty clay loam, clay loam.	CL, CH, ML, MH	A-7	0	100	95-100	90-100	70-100	40-65	15-30

Table 17.--Physical and Chemical Properties of the Soils

(Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
Ac-------------	0-9	40-60	1.35-1.40	0.01-0.2	0.11-0.13	7.4-8.4	<2	Very high	0.28	5	4	2-3
Albaton	9-60	50-60	1.35-1.45	0.01-0.06	0.11-0.13	7.4-8.4	<2	Very high	0.28			
Ad-------------	0-60	45-70	1.20-1.30	0.01-0.06	0.11-0.14	7.4-8.4	0	Very high	0.28	5	8	2-3
Albaton												
AeA------------	0-6	27-32	1.20-1.35	0.6-2.0	0.19-0.22	5.6-7.8	0-2	Moderate	0.28	5	7	4-8
Alcester	6-38	20-32	1.20-1.35	0.6-2.0	0.19-0.22	6.1-7.8	0-2	Moderate	0.28			
	38-60	20-32	1.30-1.45	0.6-2.0	0.17-0.20	6.6-8.4	0-2	Moderate	0.43			
Ba-------------	0-18	27-40	1.15-1.25	0.2-0.6	0.16-0.20	7.4-8.4	0	Moderate	0.37	5	4L	4-8
Baltic	18-45	35-60	1.20-1.40	0.06-0.2	0.11-0.18	7.4-8.4	2-4	High------	0.28			
	45-60	30-50	1.25-1.45	0.06-0.6	0.08-0.17	7.4-8.4	2-4	High------	0.32			
Bb-------------	0-9	27-38	1.25-1.30	0.6-2.0	0.20-0.22	7.4-8.4	0	Moderate	0.32	5	4L	1-3
Blake	9-25	22-35	1.25-1.30	0.6-2.0	0.20-0.22	7.4-8.4	0	Moderate	0.43			
	25-60	10-20	1.30-1.35	0.6-2.0	0.20-0.22	7.4-8.4	0	Low-------	0.43			
Bf-------------	0-15	40-55	1.30-1.35	0.06-0.2	0.12-0.14	6.1-7.3	0	High------	0.28	5	4	3-5
Blencoe	15-33	35-50	1.30-1.35	0.06-0.2	0.18-0.20	6.6-7.8	0	High------	0.43			
	33-42	18-24	1.35-1.40	0.6-2.0	0.20-0.22	7.4-8.4	0	Moderate	0.43			
	42-80	40-55	1.35-1.40	0.06-0.2	0.12-0.14	7.4-8.4	0	High------	0.43			
Bg-------------	0-18	10-20	1.20-1.40	0.6-2.0	0.21-0.24	6.6-8.4	0	Low-------	0.32	5	5	2-4
Blyburg	18-60	10-20	1.30-1.50	0.6-2.0	0.17-0.22	7.9-8.4	0	Low-------	0.43			
Bk:												
Blyburg---------	0-18	10-20	1.20-1.40	0.6-2.0	0.21-0.24	6.6-8.4	0	Low-------	0.32	5	5	2-4
	18-60	10-20	1.30-1.50	0.6-2.0	0.17-0.22	7.9-8.4	0	Low-------	0.43			
Gayville--------	0-1	20-27	1.15-1.20	0.6-2.0	0.17-0.20	6.1-9.0	0-2	Low-------	0.37	2	6	2-5
	1-12	35-45	1.35-1.45	0.00-0.06	0.10-0.16	7.4-9.0	4-16	High------	0.28			
	12-18	27-35	1.30-1.40	0.2-0.6	0.14-0.16	7.9-9.6	4-16	Moderate	0.43			
	18-31	20-27	1.30-1.40	0.2-2.0	0.16-0.18	7.9-9.6	4-16	Low-------	0.32			
	31-80	5-27	1.35-1.50	0.2-2.0	0.15-0.17	7.9-9.6	4-16	Low-------	0.43			
Bm-------------	0-43	20-27	1.20-1.30	0.6-2.0	0.19-0.22	6.6-8.4	0-2	Low-------	0.24	5	6	4-8
Bon	43-56	15-30	1.25-1.40	0.6-2.0	0.13-0.17	7.4-8.4	0-2	Low-------	0.32			
	56-60	10-30	1.25-1.40	0.6-6.0	0.11-0.16	7.4-8.4	0-2	Low-------	0.32			
Bn-------------	0-43	20-27	1.20-1.30	0.6-2.0	0.19-0.22	6.6-8.4	0-2	Low-------	0.24	5	6	4-8
Bon	43-56	15-30	1.25-1.40	0.6-2.0	0.13-0.17	7.4-8.4	0-2	Low-------	0.32			
	56-60	15-30	1.25-1.40	0.6-6.0	0.11-0.16	7.4-8.4	0-2	Low-------	0.32			
Ca:												
Chancellor------	0-10	30-40	1.15-1.25	0.06-0.6	0.13-0.19	6.1-7.3	0-2	High------	0.37	5	7	4-6
	10-41	35-55	1.20-1.35	0.06-0.2	0.11-0.19	6.1-7.8	0-2	High------	0.28			
	41-60	25-40	1.35-1.50	0.06-0.6	0.14-0.20	7.4-8.4	2-4	High------	0.43			
Tetonka---------	0-12	20-27	1.10-1.25	0.6-2.0	0.19-0.22	5.6-7.3	0-2	Moderate	0.37	5	6	4-8
	12-20	25-35	1.15-1.25	0.2-0.6	0.19-0.22	5.6-7.3	0-2	Moderate	0.37			
	20-31	35-60	1.20-1.35	0.06-0.2	0.13-0.19	6.1-7.8	0-2	High------	0.28			
	31-60	30-50	1.35-1.50	0.06-0.6	0.11-0.17	6.6-8.4	2-8	High------	0.32			

Table 17.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
Cc---------------	0-7	18-27	1.30-1.60	0.6-2.0	0.20-0.22	6.6-7.8	0-2	Low-------	0.28	5	4L	2-5
Chaska	7-43	18-27	1.40-1.65	0.6-2.0	0.17-0.19	7.4-7.8	0-2	Low-------	0.28			
	43-80	2-27	1.40-1.65	2.0-6.0	0.07-0.16	7.4-8.4	0-2	Low-------	0.28			
Cd---------------	0-13	40-50	1.15-1.30	0.06-0.2	0.16-0.19	6.1-7.8	0-2	High------	0.28	5	4	4-6
Clamo	13-23	35-50	1.20-1.25	0.06-0.2	0.15-0.18	6.6-8.4	0-2	High------	0.28			
	23-60	25-40	1.20-1.30	0.06-2.0	0.14-0.16	7.4-8.4	2-8	Moderate	0.28			
DaA--------------	0-14	15-25	1.40-1.55	0.6-2.0	0.18-0.20	6.1-7.3	0	Low-------	0.24	4	5	2-4
Dalesburg	14-34	5-18	1.35-1.50	2.0-6.0	0.09-0.15	6.1-7.8	0	Low-------	0.20			
	34-62	5-15	1.40-1.60	6.0-20	0.09-0.15	6.6-8.4	0	Low-------	0.15			
	62-80	5-10	1.60-1.75	6.0-20	0.03-0.06	6.6-8.4	0	Low-------	0.10			
DbB:												
Dalesburg-------	0-14	15-25	1.40-1.55	0.6-2.0	0.18-0.20	6.1-7.3	0	Low-------	0.24	4	5	2-4
	14-34	5-18	1.35-1.50	2.0-6.0	0.09-0.15	6.1-7.8	0	Low-------	0.20			
	34-62	5-15	1.40-1.60	6.0-20	0.09-0.15	6.6-8.4	0	Low-------	0.15			
	62-80	5-10	1.60-1.75	6.0-20	0.03-0.06	6.6-8.4	0	Low-------	0.10			
Dimo------------	0-12	27-30	1.25-1.35	0.6-2.0	0.18-0.20	5.6-7.3	0-2	Moderate	0.24	4	6	4-6
	12-30	20-34	1.30-1.40	0.6-2.0	0.16-0.20	6.1-7.8	0-2	Moderate	0.28			
	30-60	5-10	1.60-1.75	6.0-60	0.03-0.06	7.4-8.4	0-2	Low-------	0.10			
DcA, DcB---------	0-8	18-27	1.20-1.30	0.6-2.0	0.18-0.22	6.1-7.3	0-2	Low-------	0.24	5	6	4-6
Davis	8-41	18-30	1.20-1.35	0.6-2.0	0.18-0.22	6.1-7.8	0-2	Moderate	0.24			
	41-60	18-27	1.25-1.40	0.6-2.0	0.18-0.20	7.4-8.4	0-4	Low-------	0.24			
DhA:												
Davison---------	0-8	18-26	1.20-1.30	0.6-2.0	0.18-0.20	6.6-8.4	0-2	Low-------	0.24	5	4L	2-5
	8-24	18-30	1.20-1.35	0.6-2.0	0.13-0.17	7.4-9.0	0-2	Moderate	0.37			
	24-47	18-30	1.25-1.35	0.6-2.0	0.16-0.20	7.4-8.4	2-4	Moderate	0.37			
	47-60	15-30	1.30-1.45	0.2-2.0	0.10-0.18	7.4-8.4	2-8	Low-------	0.37			
Chancellor------	0-10	30-40	1.15-1.25	0.06-0.6	0.13-0.19	6.1-7.3	0-2	High------	0.37	5	7	4-6
	10-41	35-55	1.20-1.35	0.06-0.2	0.11-0.19	6.1-7.8	0-2	High------	0.28			
	41-60	25-40	1.35-1.50	0.06-0.6	0.14-0.20	7.4-8.4	2-4	High------	0.43			
DkA:												
Davison---------	0-8	18-26	1.20-1.30	0.6-2.0	0.18-0.20	6.6-8.4	0-2	Low-------	0.24	5	4L	2-5
	8-24	18-30	1.20-1.35	0.6-2.0	0.13-0.17	7.4-9.0	0-2	Moderate	0.37			
	24-47	18-30	1.25-1.35	0.6-2.0	0.16-0.20	7.4-8.4	2-4	Moderate	0.37			
	47-60	15-30	1.30-1.45	0.2-2.0	0.10-0.18	7.4-8.4	2-8	Low-------	0.37			
Tetonka---------	0-12	20-27	1.10-1.25	0.6-2.0	0.19-0.22	5.6-7.3	0-2	Moderate	0.37	5	6	4-8
	12-20	25-35	1.15-1.25	0.2-0.6	0.19-0.22	5.6-7.3	0-2	Moderate	0.37			
	20-31	35-60	1.20-1.35	0.06-0.2	0.13-0.19	6.1-7.8	0-2	High------	0.28			
	31-60	30-50	1.35-1.50	0.06-0.6	0.11-0.17	6.6-8.4	2-8	High------	0.32			
Egan------------	0-8	27-35	1.15-1.25	0.6-2.0	0.19-0.22	6.1-7.3	0-2	Moderate	0.28	5	7	3-5
	8-26	25-35	1.20-1.35	0.6-2.0	0.17-0.20	6.1-7.8	0-2	Moderate	0.43			
	26-34	25-35	1.20-1.35	0.6-2.0	0.17-0.20	7.4-8.4	0-2	Moderate	0.43			
	34-54	25-35	1.50-1.70	0.2-0.6	0.17-0.20	7.4-8.4	0-4	Moderate	0.37			
	54-60	25-35	1.50-1.70	0.2-0.6	0.17-0.20	7.4-9.0	2-8	Moderate	0.37			
DmB:												
Delmont---------	0-6	20-27	1.20-1.30	0.6-2.0	0.18-0.20	6.1-7.8	0-2	Low-------	0.28	3	6	2-4
	6-18	18-30	1.20-1.35	0.6-6.0	0.12-0.18	6.1-7.8	0-2	Low-------	0.28			
	18-60	0-5	1.60-1.75	6.0-20	0.03-0.06	7.4-8.4	0-2	Low-------	0.10			
Enet------------	0-6	20-27	1.20-1.30	0.6-2.0	0.18-0.20	5.6-7.3	0-2	Low-------	0.24	4	6	2-4
	6-26	18-30	1.20-1.35	0.6-2.0	0.18-0.22	6.6-7.8	0-2	Low-------	0.28			
	26-60	0-5	1.50-1.70	6.0-20	0.03-0.06	7.4-8.4	0-2	Low-------	0.10			

Table 17.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
DnD:												
Delmont---------	0-6	20-27	1.20-1.30	0.6-2.0	0.18-0.20	6.1-7.8	0-2	Low-------	0.28	3	6	2-4
	6-18	18-30	1.20-1.35	0.6-6.0	0.12-0.18	6.1-7.8	0-2	Low-------	0.28			
	18-60	0-5	1.60-1.75	6.0-20	0.03-0.06	7.4-8.4	0-2	Low-------	0.10			
Talmo-----------	0-9	18-25	1.20-1.45	0.6-2.0	0.18-0.20	6.6-7.8	0-2	Low-------	0.20	2	5	1-3
	9-60	0-10	1.45-1.65	6.0-60	0.03-0.06	7.4-8.4	0-2	Low-------	0.05			
Do--------------- Dimo	0-12	27-30	1.25-1.35	0.6-2.0	0.18-0.20	5.6-7.3	0-2	Moderate	0.24	4	6	4-6
	12-30	20-34	1.30-1.40	0.6-2.0	0.16-0.20	6.1-7.8	0-2	Moderate	0.28			
	30-60	5-10	1.60-1.75	6.0-60	0.03-0.06	7.4-8.4	0-2	Low-------	0.10			
EaA:												
Egan------------	0-8	27-35	1.15-1.25	0.6-2.0	0.19-0.22	6.1-7.3	0-2	Moderate	0.28	5	7	3-5
	8-26	25-35	1.20-1.35	0.6-2.0	0.17-0.20	6.1-7.8	0-2	Moderate	0.43			
	26-34	25-35	1.20-1.35	0.6-2.0	0.17-0.20	7.4-8.4	0-2	Moderate	0.43			
	34-54	25-35	1.50-1.70	0.2-0.6	0.17-0.20	7.4-8.4	0-4	Moderate	0.37			
	54-60	25-35	1.50-1.70	0.2-0.6	0.17-0.20	7.4-9.0	2-8	Moderate	0.37			
Chancellor------	0-10	30-40	1.15-1.25	0.06-0.6	0.13-0.19	6.1-7.3	0-2	High------	0.37	5	7	4-6
	10-41	35-55	1.20-1.35	0.06-0.2	0.11-0.19	6.1-7.8	0-2	High------	0.28			
	41-60	25-40	1.35-1.50	0.06-0.6	0.14-0.20	7.4-8.4	2-4	High------	0.43			
Davison---------	0-8	18-26	1.20-1.30	0.6-2.0	0.18-0.20	6.6-8.4	0-2	Low-------	0.24	5	4L	2-5
	8-24	18-30	1.20-1.35	0.6-2.0	0.13-0.17	7.4-9.0	0-2	Moderate	0.37			
	24-47	18-30	1.25-1.35	0.6-2.0	0.16-0.20	7.4-8.4	2-4	Moderate	0.37			
	47-60	15-30	1.30-1.45	0.2-2.0	0.10-0.18	7.4-8.4	2-8	Low-------	0.37			
EbA:												
Egan------------	0-8	27-35	1.15-1.25	0.6-2.0	0.19-0.22	6.1-7.3	0-2	Moderate	0.28	5	7	3-5
	8-26	25-35	1.20-1.35	0.6-2.0	0.17-0.20	6.1-7.8	0-2	Moderate	0.43			
	26-34	25-35	1.20-1.35	0.6-2.0	0.17-0.20	7.4-8.4	0-2	Moderate	0.43			
	34-54	25-35	1.50-1.70	0.2-0.6	0.17-0.20	7.4-8.4	0-4	Moderate	0.37			
	54-60	25-35	1.50-1.70	0.2-0.6	0.17-0.20	7.4-9.0	2-8	Moderate	0.37			
Clarno----------	0-7	20-27	1.20-1.30	0.6-2.0	0.17-0.19	6.1-7.3	0-2	Low-------	0.24	5	6	2-5
	7-16	20-30	1.25-1.40	0.6-2.0	0.16-0.20	6.1-7.8	0-2	Moderate	0.28			
	16-53	20-30	1.25-1.40	0.6-2.0	0.16-0.20	7.4-8.4	0-4	Moderate	0.37			
	53-60	20-30	1.50-1.70	0.2-0.6	0.16-0.20	7.4-9.0	2-8	Moderate	0.37			
Chancellor------	0-10	30-40	1.15-1.25	0.06-0.6	0.13-0.19	6.1-7.3	0-2	High------	0.37	5	7	4-6
	10-41	35-55	1.20-1.35	0.06-0.2	0.11-0.19	6.1-7.8	0-2	High------	0.28			
	41-60	25-40	1.35-1.50	0.06-0.6	0.14-0.20	7.4-8.4	2-4	High------	0.43			
EcA:												
Egan------------	0-8	27-35	1.15-1.25	0.6-2.0	0.19-0.22	6.1-7.3	0-2	Moderate	0.28	5	7	3-5
	8-26	25-35	1.20-1.35	0.6-2.0	0.17-0.20	6.1-7.8	0-2	Moderate	0.43			
	26-34	25-35	1.20-1.35	0.6-2.0	0.17-0.20	7.4-8.4	0-2	Moderate	0.43			
	34-54	25-35	1.50-1.70	0.2-0.6	0.17-0.20	7.4-8.4	0-4	Moderate	0.37			
	54-60	25-35	1.50-1.70	0.2-0.6	0.17-0.20	7.4-9.0	2-8	Moderate	0.37			
Clarno----------	0-7	20-27	1.20-1.30	0.6-2.0	0.17-0.19	6.1-7.3	0-2	Low-------	0.24	5	6	2-5
	7-16	20-30	1.25-1.40	0.6-2.0	0.16-0.20	6.1-7.8	0-2	Moderate	0.28			
	16-53	20-30	1.25-1.40	0.6-2.0	0.16-0.20	7.4-8.4	0-4	Moderate	0.37			
	53-60	20-30	1.50-1.70	0.2-0.6	0.16-0.20	7.4-9.0	2-8	Moderate	0.37			
Tetonka---------	0-12	20-27	1.10-1.25	0.6-2.0	0.19-0.22	5.6-7.3	0-2	Moderate	0.37	5	6	4-8
	12-20	25-35	1.15-1.25	0.2-0.6	0.19-0.22	5.6-7.3	0-2	Moderate	0.37			
	20-31	35-60	1.20-1.35	0.06-0.2	0.13-0.19	6.1-7.8	0-2	High------	0.28			
	31-60	30-50	1.35-1.50	0.06-0.6	0.11-0.17	6.6-8.4	2-8	High------	0.32			

Table 17.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
EdA, EdB:												
Egan------------	0-8	27-35	1.15-1.25	0.6-2.0	0.19-0.22	6.1-7.3	0-2	Moderate	0.28	5	7	3-5
	8-26	25-35	1.20-1.35	0.6-2.0	0.17-0.20	6.1-7.8	0-2	Moderate	0.43			
	26-34	25-35	1.20-1.35	0.6-2.0	0.17-0.20	7.4-8.4	0-2	Moderate	0.43			
	34-54	25-35	1.50-1.70	0.2-0.6	0.17-0.20	7.4-8.4	0-4	Moderate	0.37			
	54-60	25-35	1.50-1.70	0.2-0.6	0.17-0.20	7.4-9.0	2-8	Moderate	0.37			
Clarno----------	0-7	20-27	1.20-1.30	0.6-2.0	0.17-0.19	6.1-7.3	0-2	Low--------	0.24	5	6	2-5
	7-16	20-30	1.25-1.40	0.6-2.0	0.16-0.20	6.1-7.8	0-2	Moderate	0.28			
	16-53	20-30	1.25-1.40	0.6-2.0	0.16-0.20	7.4-8.4	0-4	Moderate	0.37			
	53-60	20-30	1.50-1.70	0.2-0.6	0.16-0.20	7.4-9.0	2-8	Moderate	0.37			
Trent-----------	0-17	27-35	1.15-1.25	0.6-2.0	0.19-0.22	5.6-7.3	0-2	Moderate	0.28	5	7	4-8
	17-28	27-35	1.20-1.35	0.6-2.0	0.17-0.20	6.1-7.3	0-2	Moderate	0.32			
	28-47	25-33	1.25-1.40	0.6-2.0	0.17-0.20	6.1-7.3	0-2	Moderate	0.43			
	47-52	20-30	1.30-1.45	0.6-2.0	0.17-0.20	7.4-8.4	0-2	Moderate	0.43			
	52-60	20-30	1.30-1.45	0.6-2.0	0.17-0.20	6.6-8.4	2-4	Moderate	0.43			
EeB:												
Egan------------	0-8	27-35	1.15-1.25	0.6-2.0	0.19-0.22	6.1-7.3	0-2	Moderate	0.28	5	7	3-5
	8-26	25-35	1.20-1.35	0.6-2.0	0.17-0.20	6.1-7.8	0-2	Moderate	0.43			
	26-34	25-35	1.20-1.35	0.6-2.0	0.17-0.20	7.4-8.4	0-2	Moderate	0.43			
	34-54	25-35	1.50-1.70	0.2-0.6	0.17-0.20	7.4-8.4	0-4	Moderate	0.37			
	54-60	25-35	1.50-1.70	0.2-0.6	0.17-0.20	7.4-9.0	2-8	Moderate	0.37			
Ethan-----------	0-8	20-27	1.20-1.30	0.6-2.0	0.18-0.20	6.6-8.4	0-2	Low--------	0.28	5	4L	1-3
	8-51	18-30	1.30-1.45	0.6-2.0	0.16-0.20	7.4-8.4	0-2	Moderate	0.32			
	51-60	18-30	1.45-1.70	0.2-2.0	0.16-0.20	7.4-9.0	2-4	Moderate	0.37			
EfB:												
Egan------------	0-8	27-35	1.15-1.25	0.6-2.0	0.19-0.22	6.1-7.3	0-2	Moderate	0.28	5	7	3-5
	8-26	25-35	1.20-1.35	0.6-2.0	0.17-0.20	6.1-7.8	0-2	Moderate	0.43			
	26-34	25-35	1.20-1.35	0.6-2.0	0.17-0.20	7.4-8.4	0-2	Moderate	0.43			
	34-54	25-35	1.50-1.70	0.2-0.6	0.17-0.20	7.4-8.4	0-4	Moderate	0.37			
	54-60	25-35	1.50-1.70	0.2-0.6	0.17-0.20	7.4-9.0	2-8	Moderate	0.37			
Ethan-----------	0-8	20-27	1.20-1.30	0.6-2.0	0.18-0.20	6.6-8.4	0-2	Low--------	0.28	5	4L	1-3
	8-51	18-30	1.30-1.45	0.6-2.0	0.16-0.20	7.4-8.4	0-2	Moderate	0.32			
	51-60	18-30	1.45-1.70	0.2-2.0	0.16-0.20	7.4-9.0	2-4	Moderate	0.37			
Tetonka---------	0-12	20-27	1.10-1.25	0.6-2.0	0.19-0.22	5.6-7.3	0-2	Moderate	0.37	5	6	4-8
	12-20	25-35	1.15-1.25	0.2-0.6	0.19-0.22	5.6-7.3	0-2	Moderate	0.37			
	20-31	35-60	1.20-1.35	0.06-0.2	0.13-0.19	6.1-7.8	0-2	High-------	0.28			
	31-60	30-50	1.35-1.50	0.06-0.6	0.11-0.17	6.6-8.4	2-8	High-------	0.32			
EgB:												
Egan------------	0-8	27-35	1.15-1.25	0.6-2.0	0.19-0.22	6.1-7.3	0-2	Moderate	0.28	5	7	3-5
	8-26	25-35	1.20-1.35	0.6-2.0	0.17-0.20	6.1-7.8	0-2	Moderate	0.43			
	26-34	25-35	1.20-1.35	0.6-2.0	0.17-0.20	7.4-8.4	0-2	Moderate	0.43			
	34-54	25-35	1.50-1.70	0.2-0.6	0.17-0.20	7.4-8.4	0-4	Moderate	0.37			
	54-60	25-35	1.50-1.70	0.2-0.6	0.17-0.20	7.4-9.0	2-8	Moderate	0.37			
Ethan-----------	0-8	20-27	1.20-1.30	0.6-2.0	0.18-0.20	6.6-8.4	0-2	Low--------	0.28	5	4L	1-3
	8-51	18-30	1.30-1.45	0.6-2.0	0.16-0.20	7.4-8.4	0-2	Moderate	0.32			
	51-60	18-30	1.45-1.70	0.2-2.0	0.16-0.20	7.4-9.0	2-4	Moderate	0.37			
Trent-----------	0-17	27-35	1.15-1.25	0.6-2.0	0.19-0.22	5.6-7.3	0-2	Moderate	0.28	5	7	4-8
	17-28	27-35	1.20-1.35	0.6-2.0	0.17-0.20	6.1-7.3	0-2	Moderate	0.32			
	28-47	25-33	1.25-1.40	0.6-2.0	0.17-0.20	6.1-7.3	0-2	Moderate	0.43			
	47-52	20-30	1.30-1.45	0.6-2.0	0.17-0.20	7.4-8.4	0-2	Moderate	0.43			
	52-60	20-30	1.30-1.45	0.6-2.0	0.17-0.20	6.6-8.4	2-4	Moderate	0.43			

Table 17.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
EhA, EhB:												
Egan------------	0-8	27-35	1.15-1.25	0.6-2.0	0.19-0.22	6.1-7.3	0-2	Moderate	0.28	5	7	3-5
	8-26	25-35	1.20-1.35	0.6-2.0	0.17-0.20	6.1-7.8	0-2	Moderate	0.43			
	26-34	25-35	1.20-1.35	0.6-2.0	0.17-0.20	7.4-8.4	0-2	Moderate	0.43			
	34-54	25-35	1.50-1.70	0.2-0.6	0.17-0.20	7.4-8.4	0-4	Moderate	0.37			
	54-60	25-35	1.50-1.70	0.2-0.6	0.17-0.20	7.4-9.0	2-8	Moderate	0.37			
Trent-----------	0-17	27-35	1.15-1.25	0.6-2.0	0.19-0.22	5.6-7.3	0-2	Moderate	0.28	5	7	4-8
	17-28	27-35	1.20-1.35	0.6-2.0	0.17-0.20	6.1-7.3	0-2	Moderate	0.32			
	28-47	25-33	1.25-1.40	0.6-2.0	0.17-0.20	6.1-7.3	0-2	Moderate	0.43			
	47-52	20-30	1.30-1.45	0.6-2.0	0.17-0.20	7.4-8.4	0-2	Moderate	0.43			
	52-60	20-30	1.30-1.45	0.6-2.0	0.17-0.20	6.6-8.4	2-4	Moderate	0.43			
Ek:												
Egan------------	0-8	27-35	1.15-1.25	0.6-2.0	0.19-0.22	6.1-7.3	0-2	Moderate	0.28	5	7	3-5
	8-26	25-35	1.20-1.35	0.6-2.0	0.17-0.20	6.1-7.8	0-2	Moderate	0.43			
	26-34	25-35	1.20-1.35	0.6-2.0	0.17-0.20	7.4-8.4	0-2	Moderate	0.43			
	34-54	25-35	1.50-1.70	0.2-0.6	0.17-0.20	7.4-8.4	0-4	Moderate	0.37			
	54-60	25-35	1.50-1.70	0.2-0.6	0.17-0.20	7.4-9.0	2-8	Moderate	0.37			
Trent-----------	0-17	27-35	1.15-1.25	0.6-2.0	0.19-0.22	5.6-7.3	0-2	Moderate	0.28	5	7	4-8
	17-28	27-35	1.20-1.35	0.6-2.0	0.17-0.20	6.1-7.3	0-2	Moderate	0.32			
	28-47	25-33	1.25-1.40	0.6-2.0	0.17-0.20	6.1-7.3	0-2	Moderate	0.43			
	47-52	20-30	1.30-1.45	0.6-2.0	0.17-0.20	7.4-8.4	0-2	Moderate	0.43			
	52-60	20-30	1.30-1.45	0.6-2.0	0.17-0.20	6.6-8.4	2-4	Moderate	0.43			
Chancellor------	0-10	30-40	1.15-1.25	0.06-0.6	0.13-0.19	6.1-7.3	0-2	High------	0.37	5	7	4-6
	10-41	35-55	1.20-1.35	0.06-0.2	0.11-0.19	6.1-7.8	0-2	High------	0.28			
	41-60	25-40	1.35-1.50	0.06-0.6	0.14-0.20	7.4-8.4	2-4	High------	0.43			
Em--------------- Enet	0-12	18-27	1.20-1.30	0.6-2.0	0.20-0.22	5.6-7.3	0-2	Low-------	0.24	4	6	2-4
	12-23	18-27	1.20-1.35	0.6-2.0	0.20-0.22	5.6-7.3	0-2	Low-------	0.28			
	23-31	15-27	1.20-1.40	0.6-2.0	0.20-0.22	5.6-7.3	0-2	Low-------	0.32			
	31-80	2-10	1.20-1.50	6.0-20	0.02-0.07	6.1-7.8	0-2	Low-------	0.15			
EnB:												
Enet------------	0-6	20-27	1.20-1.30	0.6-2.0	0.18-0.20	5.6-7.3	0-2	Low-------	0.24	4	6	2-4
	6-26	18-30	1.20-1.35	0.6-2.0	0.18-0.22	6.6-7.8	0-2	Low-------	0.28			
	26-60	0-5	1.50-1.70	6.0-20	0.03-0.06	7.4-8.4	0-2	Low-------	0.10			
Storla----------	0-9	18-26	1.20-1.30	0.6-2.0	0.18-0.22	6.6-8.4	0-2	Low-------	0.28	3	4L	2-4
	9-25	18-26	1.25-1.40	0.6-2.0	0.12-0.18	7.4-8.4	0-2	Low-------	0.28			
	25-60	5-10	1.40-1.65	2.0-20	0.03-0.06	7.4-8.4	0-2	Low-------	0.10			
Tetonka---------	0-12	20-27	1.10-1.25	0.6-2.0	0.19-0.22	5.6-7.3	0-2	Moderate	0.37	5	6	4-8
	12-20	25-35	1.15-1.25	0.2-0.6	0.19-0.22	5.6-7.3	0-2	Moderate	0.37			
	20-31	35-60	1.20-1.35	0.06-0.2	0.13-0.19	6.1-7.8	0-2	High------	0.28			
	31-60	30-50	1.35-1.50	0.06-0.6	0.11-0.17	6.6-8.4	2-8	High------	0.32			
EoD, EoE:												
Ethan-----------	0-8	20-27	1.20-1.30	0.6-2.0	0.18-0.20	6.6-8.4	0-2	Low-------	0.28	5	4L	1-3
	8-51	18-30	1.30-1.45	0.6-2.0	0.16-0.20	7.4-8.4	0-2	Moderate	0.32			
	51-60	18-30	1.45-1.70	0.2-2.0	0.16-0.20	7.4-9.0	2-4	Moderate	0.37			
Betts-----------	0-4	18-27	1.20-1.30	0.6-2.0	0.16-0.18	6.6-8.4	0-2	Low-------	0.28	5	4L	1-3
	4-41	20-35	1.20-1.35	0.6-2.0	0.17-0.20	7.4-8.4	0-2	Moderate	0.32			
	41-60	20-35	1.50-1.70	0.2-0.6	0.17-0.20	7.4-8.4	2-8	Moderate	0.37			

Table 17.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
EpD, EpE:												
Ethan-----------	0-8	20-27	1.20-1.30	0.6-2.0	0.18-0.20	6.6-8.4	0-2	Low-------	0.28	5	4L	1-3
	8-51	18-30	1.30-1.45	0.6-2.0	0.16-0.20	7.4-8.4	0-2	Moderate	0.32			
	51-60	18-30	1.45-1.70	0.2-2.0	0.16-0.20	7.4-9.0	2-4	Moderate	0.37			
Bon-------------	0-43	20-27	1.20-1.30	0.6-2.0	0.19-0.22	6.6-8.4	0-2	Low-------	0.24	5	6	4-8
	43-56	15-30	1.25-1.40	0.6-2.0	0.13-0.17	7.4-8.4	0-2	Low-------	0.32			
	56-60	15-30	1.25-1.40	0.6-6.0	0.11-0.16	7.4-8.4	0-2	Low-------	0.32			
ErC, ErD:												
Ethan-----------	0-8	20-27	1.20-1.30	0.6-2.0	0.18-0.20	6.6-8.4	0-2	Low-------	0.28	5	4L	1-3
	8-51	18-30	1.30-1.45	0.6-2.0	0.16-0.20	7.4-8.4	0-2	Moderate	0.32			
	51-60	18-30	1.45-1.70	0.2-2.0	0.16-0.20	7.4-9.0	2-4	Moderate	0.37			
Clarno----------	0-7	20-27	1.20-1.30	0.6-2.0	0.17-0.19	6.1-7.3	0-2	Low-------	0.24	5	6	2-5
	7-16	20-30	1.25-1.40	0.6-2.0	0.16-0.20	6.1-7.8	0-2	Moderate	0.28			
	16-53	20-30	1.25-1.40	0.6-2.0	0.16-0.20	7.4-8.4	0-4	Moderate	0.37			
	53-60	20-30	1.50-1.70	0.2-0.6	0.16-0.20	7.4-9.0	2-8	Moderate	0.37			
EsB:												
Ethan-----------	0-8	20-27	1.20-1.30	0.6-2.0	0.18-0.20	6.6-8.4	0-2	Low-------	0.28	5	4L	1-3
	8-51	18-30	1.30-1.45	0.6-2.0	0.16-0.20	7.4-8.4	0-2	Moderate	0.32			
	51-60	18-30	1.45-1.70	0.2-2.0	0.16-0.20	7.4-9.0	2-4	Moderate	0.37			
Clarno----------	0-7	20-27	1.20-1.30	0.6-2.0	0.17-0.19	6.1-7.3	0-2	Low-------	0.24	5	6	2-5
	7-16	20-30	1.25-1.40	0.6-2.0	0.16-0.20	6.1-7.8	0-2	Moderate	0.28			
	16-53	20-30	1.25-1.40	0.6-2.0	0.16-0.20	7.4-8.4	0-4	Moderate	0.37			
	53-60	20-30	1.50-1.70	0.2-0.6	0.16-0.20	7.4-9.0	2-8	Moderate	0.37			
Bon-------------	0-43	20-27	1.20-1.30	0.6-2.0	0.19-0.22	6.6-8.4	0-2	Low-------	0.24	5	6	4-8
	43-56	15-30	1.25-1.40	0.6-2.0	0.13-0.17	7.4-8.4	0-2	Low-------	0.32			
	56-60	10-30	1.25-1.40	0.6-6.0	0.11-0.16	7.4-8.4	0-2	Low-------	0.32			
EtC:												
Ethan-----------	0-8	20-27	1.20-1.30	0.6-2.0	0.18-0.20	6.6-8.4	0-2	Low-------	0.28	5	4L	1-3
	8-51	18-30	1.30-1.45	0.6-2.0	0.16-0.20	7.4-8.4	0-2	Moderate	0.32			
	51-60	18-30	1.45-1.70	0.2-2.0	0.16-0.20	7.4-9.0	2-4	Moderate	0.37			
Clarno----------	0-7	20-27	1.20-1.30	0.6-2.0	0.17-0.19	6.1-7.3	0-2	Low-------	0.24	5	6	2-5
	7-16	20-30	1.25-1.40	0.6-2.0	0.16-0.20	6.1-7.8	0-2	Moderate	0.28			
	16-53	20-30	1.25-1.40	0.6-2.0	0.16-0.20	7.4-8.4	0-4	Moderate	0.37			
	53-60	20-30	1.50-1.70	0.2-0.6	0.16-0.20	7.4-9.0	2-8	Moderate	0.37			
Bon-------------	0-43	20-27	1.20-1.30	0.6-2.0	0.19-0.22	6.6-8.4	0-2	Low-------	0.24	5	6	4-8
	43-56	15-30	1.25-1.40	0.6-2.0	0.13-0.17	7.4-8.4	0-2	Low-------	0.32			
	56-60	15-30	1.25-1.40	0.6-6.0	0.11-0.16	7.4-8.4	0-2	Low-------	0.32			
EuB:												
Ethan-----------	0-8	20-27	1.20-1.30	0.6-2.0	0.18-0.20	6.6-8.4	0-2	Low-------	0.28	5	4L	1-3
	8-51	18-30	1.30-1.45	0.6-2.0	0.16-0.20	7.4-8.4	0-2	Moderate	0.32			
	51-60	18-30	1.45-1.70	0.2-2.0	0.16-0.20	7.4-9.0	2-4	Moderate	0.37			
Davison---------	0-8	18-26	1.20-1.30	0.6-2.0	0.18-0.20	6.6-8.4	0-2	Low-------	0.24	5	4L	2-5
	8-24	18-30	1.20-1.35	0.6-2.0	0.13-0.17	7.4-9.0	0-2	Moderate	0.37			
	24-47	18-30	1.25-1.35	0.6-2.0	0.16-0.20	7.4-8.4	2-4	Moderate	0.37			
	47-60	15-30	1.30-1.45	0.2-2.0	0.10-0.18	7.4-8.4	2-8	Low-------	0.37			
Tetonka---------	0-12	20-27	1.10-1.25	0.6-2.0	0.19-0.22	5.6-7.3	0-2	Moderate	0.37	5	6	4-8
	12-20	25-35	1.15-1.25	0.2-0.6	0.19-0.22	5.6-7.3	0-2	Moderate	0.37			
	20-31	35-60	1.20-1.35	0.06-0.2	0.13-0.19	6.1-7.8	0-2	High------	0.28			
	31-60	30-50	1.35-1.50	0.06-0.6	0.11-0.17	6.6-8.4	2-8	High------	0.32			

Table 17.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
EvC:												
Ethan-----------	0-8	20-27	1.20-1.30	0.6-2.0	0.18-0.20	6.6-8.4	0-2	Low-------	0.28	5	4L	1-3
	8-51	18-30	1.30-1.45	0.6-2.0	0.16-0.20	7.4-8.4	0-2	Moderate	0.32			
	51-60	18-30	1.45-1.70	0.2-2.0	0.16-0.20	7.4-9.0	2-4	Moderate	0.37			
Egan------------	0-8	27-35	1.15-1.25	0.6-2.0	0.19-0.22	6.1-7.3	0-2	Moderate	0.28	5	7	3-5
	8-26	25-35	1.20-1.35	0.6-2.0	0.17-0.20	6.1-7.8	0-2	Moderate	0.43			
	26-34	25-35	1.20-1.35	0.6-2.0	0.17-0.20	7.4-8.4	0-2	Moderate	0.43			
	34-54	25-35	1.50-1.70	0.2-0.6	0.17-0.20	7.4-8.4	0-4	Moderate	0.37			
	54-60	25-35	1.50-1.70	0.2-0.6	0.17-0.20	7.4-9.0	2-8	Moderate	0.37			
EzE:												
Ethan-----------	0-8	20-27	1.20-1.30	0.6-2.0	0.18-0.20	6.6-8.4	0-2	Low-------	0.28	5	4L	1-3
	8-51	18-30	1.30-1.45	0.6-2.0	0.16-0.20	7.4-8.4	0-2	Moderate	0.32			
	51-60	18-30	1.45-1.70	0.2-2.0	0.16-0.20	7.4-9.0	2-4	Moderate	0.37			
Talmo-----------	0-9	18-25	1.20-1.45	0.6-2.0	0.18-0.20	6.6-7.8	0-2	Low-------	0.20	2	5	1-3
	9-60	0-10	1.45-1.65	6.0-60	0.03-0.06	7.4-8.4	0-2	Low-------	0.05			
Fo--------------- Forney	0-16	40-60	1.30-1.35	0.01-0.06	0.11-0.13	6.1-7.8	0	High------	0.28	5	4	2-4
	16-80	50-60	1.35-1.45	0.01-0.06	0.11-0.13	6.1-7.8	0	High------	0.28			
Ga--------------- Grable	0-8	18-27	1.20-1.25	0.6-2.0	0.22-0.24	7.4-8.4	0	Low-------	0.32	4	4L	1-3
	8-26	12-16	1.25-1.50	0.6-2.0	0.20-0.22	7.4-8.4	0	Low-------	0.43			
	26-60	2-10	1.20-1.50	6.0-20	0.02-0.07	7.4-8.4	0	Low-------	0.15			
Gt:												
Grable----------	0-8	18-27	1.20-1.25	0.6-2.0	0.22-0.24	7.4-8.4	0	Low-------	0.32	4	4L	1-3
	8-26	12-16	1.25-1.50	0.6-2.0	0.20-0.22	7.4-8.4	0	Low-------	0.43			
	26-60	2-10	1.20-1.50	6.0-20	0.02-0.07	7.4-8.4	0	Low-------	0.15			
Ticonic---------	0-9	2-10	1.20-1.50	6.0-20	0.05-0.09	6.6-8.4	---	Low-------	0.17	5	2	.5-1
	9-13	2-5	1.20-1.50	>6.0	0.05-0.09	6.6-8.4	<2	Low-------	0.15			
	13-26	12-24	1.35-1.50	0.6-2.0	0.20-0.22	7.4-8.4	<2	Low-------	0.24			
	26-80	6-18	1.35-1.60	2.0-6.0	0.11-0.17	7.4-8.4	<2	Low-------	0.10			
Vore------------	0-8	40-55	1.30-1.35	0.06-0.2	0.12-0.14	7.4-8.4	0	High------	0.28	4	4	2-3
	8-23	28-35	1.30-1.35	0.6-2.0	0.19-0.22	7.4-8.4	0	Moderate	0.32			
	23-60	4-12	1.35-1.50	6.0-20	0.05-0.07	7.4-8.4	0	Low-------	0.10			
Gv:												
Grable----------	0-8	18-27	1.20-1.25	0.6-2.0	0.22-0.24	7.4-8.4	0	Low-------	0.32	4	4L	1-3
	8-26	12-16	1.25-1.50	0.6-2.0	0.20-0.22	7.4-8.4	0	Low-------	0.43			
	26-60	2-10	1.20-1.50	6.0-20	0.02-0.07	7.4-8.4	0	Low-------	0.15			
Vore------------	0-8	40-55	1.30-1.35	0.06-0.2	0.12-0.14	7.4-8.4	0	High------	0.28	4	4	2-3
	8-23	28-35	1.30-1.35	0.6-2.0	0.19-0.22	7.4-8.4	0	Moderate	0.32			
	23-60	4-12	1.35-1.50	6.0-20	0.05-0.07	7.4-8.4	0	Low-------	0.10			
Haynie----------	0-9	15-25	1.20-1.35	0.6-2.0	0.18-0.23	6.6-8.4	0	Low-------	0.32	5	4L	1-3
	9-60	15-18	1.20-1.35	0.6-2.0	0.18-0.23	7.4-8.4	0	Low-------	0.43			
Ha--------------- Haynie	0-9	15-25	1.20-1.35	0.6-2.0	0.18-0.23	6.6-8.4	0	Low-------	0.32	5	4L	1-3
	9-60	15-18	1.20-1.35	0.6-2.0	0.18-0.23	7.4-8.4	0	Low-------	0.43			
Hg:												
Haynie----------	0-9	15-25	1.20-1.35	0.6-2.0	0.18-0.23	6.6-8.4	0	Low-------	0.32	5	4L	1-3
	9-60	15-18	1.20-1.35	0.6-2.0	0.18-0.23	7.4-8.4	0	Low-------	0.43			
Grable----------	0-8	18-27	1.20-1.25	0.6-2.0	0.22-0.24	7.4-8.4	0	Low-------	0.32	4	4L	1-3
	8-26	12-16	1.25-1.50	0.6-2.0	0.20-0.22	7.4-8.4	0	Low-------	0.43			
	26-60	2-10	1.20-1.50	6.0-20	0.02-0.07	7.4-8.4	0	Low-------	0.15			

Table 17.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
Hn:												
Haynie----------	0-9	15-25	1.20-1.35	0.6-2.0	0.18-0.23	6.6-8.4	0	Low-------	0.32	5	4L	1-3
	9-60	15-18	1.20-1.35	0.6-2.0	0.18-0.23	7.4-8.4	0	Low-------	0.43			
Lossing---------	0-8	40-55	1.30-1.35	0.06-0.2	0.12-0.14	6.6-7.8	0	Very high	0.28	5	4	2-3
	8-13	40-55	1.30-1.40	0.06-0.2	0.12-0.14	7.4-8.4	0	Very high	0.28			
	13-18	27-35	1.25-1.30	0.2-0.6	0.20-0.22	7.4-8.4	0	High------	0.32			
	18-72	15-24	1.40-1.50	0.6-6.0	0.20-0.22	7.4-8.4	0	Low-------	0.43			
	72-80	40-55	1.40-1.50	0.06-0.2	0.10-0.12	7.4-8.4	0	Very high	0.28			
Grable----------	0-8	18-27	1.20-1.25	0.6-2.0	0.22-0.24	7.4-8.4	0	Low-------	0.32	4	4L	1-3
	8-26	12-16	1.25-1.50	0.6-2.0	0.20-0.22	7.4-8.4	0	Low-------	0.43			
	26-60	2-10	1.20-1.50	6.0-20	0.02-0.07	7.4-8.4	0	Low-------	0.15			
Ho:												
Haynie----------	0-9	15-25	1.20-1.35	0.6-2.0	0.18-0.23	6.6-8.4	0	Low-------	0.32	5	4L	1-3
	9-60	15-18	1.20-1.35	0.6-2.0	0.18-0.23	7.4-8.4	0	Low-------	0.43			
Onawa-----------	0-7	40-55	1.30-1.35	0.2-0.6	0.12-0.14	7.4-8.4	0	High------	0.28	5	4	2-3
	7-25	50-60	1.30-1.40	0.06-0.2	0.12-0.14	7.4-8.4	0	High------	0.28			
	25-60	12-18	1.40-1.50	0.6-6.0	0.20-0.22	7.4-8.4	0	Low-------	0.43			
Blake-----------	0-9	27-38	1.25-1.30	0.6-2.0	0.20-0.22	7.4-8.4	0	Moderate	0.32	5	4L	1-3
	9-25	22-35	1.25-1.30	0.6-2.0	0.20-0.22	7.4-8.4	0	Moderate	0.43			
	25-60	10-20	1.30-1.35	0.6-2.0	0.20-0.22	7.4-8.4	0	Low-------	0.43			
Ja--------------- James	0-16	40-60	1.15-1.30	0.01-0.2	0.10-0.15	7.4-9.0	8-32	Very high	0.28	5	4	2-4
	16-60	35-60	1.25-1.40	0.01-0.2	0.09-0.14	7.4-9.0	8-32	Very high	0.37			
La--------------- Lakeport	0-12	32-38	1.30-1.35	0.2-2.0	0.18-0.20	6.1-7.3	0	High------	0.28	5	4	3-4
	12-22	35-38	1.30-1.35	0.2-2.0	0.18-0.20	6.1-7.3	0	High------	0.32			
	22-38	35-42	1.35-1.40	0.2-2.0	0.17-0.19	6.6-7.8	0	High------	0.43			
	38-60	18-30	1.40-1.50	0.6-2.0	0.17-0.19	7.4-8.4	0	Moderate	0.43			
Lb--------------- Lamo	0-10	18-35	1.30-1.60	0.2-2.0	0.19-0.23	7.4-8.4	0	Moderate	0.32	5	4L	2-5
	10-60	25-35	1.30-1.50	0.2-0.6	0.18-0.22	7.4-8.4	0	Moderate	0.43			
Lc--------------- Lamo	0-10	27-35	1.30-1.40	0.2-0.6	0.21-0.23	7.4-8.4	0	Moderate	0.32	4	4L	2-5
	10-39	20-35	1.30-1.45	0.2-0.6	0.20-0.23	7.4-8.4	0	Moderate	0.37			
	39-47	20-35	1.40-1.50	0.2-0.6	0.18-0.20	7.4-8.4	0	Moderate	0.37			
	47-60	0-3	1.50-1.70	>20	0.02-0.04	6.6-7.3	0	Low-------	0.10			
Ld:												
Lamo------------	0-10	18-35	1.30-1.60	0.2-2.0	0.19-0.23	7.4-8.4	0	Moderate	0.32	5	4L	2-4
	10-60	25-35	1.30-1.50	0.2-0.6	0.18-0.22	7.4-8.4	0	Moderate	0.43			
Baltic----------	0-18	27-40	1.15-1.25	0.2-0.6	0.16-0.20	7.4-8.4	0	Moderate	0.37	5	4L	4-8
	18-45	35-60	1.20-1.40	0.06-0.2	0.11-0.18	7.4-8.4	2-4	High------	0.28			
	45-60	30-50	1.25-1.45	0.06-0.6	0.08-0.17	7.4-8.4	2-4	High------	0.32			
Le--------------- Lex	0-12	27-35	1.20-1.40	0.2-0.6	0.17-0.23	7.4-8.4	0-4	Moderate	0.28	4	4L	2-4
	12-32	18-32	1.30-1.70	0.2-2.0	0.15-0.22	6.1-8.4	0-4	Low-------	0.37			
	32-60	2-5	1.50-1.70	>20	0.02-0.06	6.1-7.8	0-4	Low-------	0.05			
Lg--------------- Lossing	0-8	40-55	1.30-1.35	0.06-0.2	0.12-0.14	6.6-7.8	0	Very high	0.28	5	4	2-3
	8-13	40-55	1.30-1.40	0.06-0.2	0.12-0.14	7.4-8.4	0	Very high	0.28			
	13-18	27-35	1.25-1.30	0.2-0.6	0.20-0.22	7.4-8.4	0	High------	0.32			
	18-72	15-24	1.40-1.50	0.6-6.0	0.20-0.22	7.4-8.4	0	Low-------	0.43			
	72-80	40-55	1.40-1.50	0.06-0.2	0.10-0.12	7.4-8.4	0	Very high	0.28			

Table 17.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
Lo:												
Lossing---------	0-8	40-55	1.30-1.35	0.06-0.2	0.12-0.14	6.6-7.8	0	Very high	0.28	5	4	2-3
	8-13	40-55	1.30-1.40	0.06-0.2	0.12-0.14	7.4-8.4	0	Very high	0.28			
	13-18	27-35	1.25-1.30	0.2-0.6	0.20-0.22	7.4-8.4	0	High------	0.32			
	18-72	15-24	1.40-1.50	0.6-6.0	0.20-0.22	7.4-8.4	0	Low-------	0.43			
	72-80	40-55	1.40-1.50	0.06-0.2	0.10-0.12	7.4-8.4	0	Very high	0.28			
Owego-----------	0-16	40-50	1.30-1.35	0.01-0.06	0.12-0.14	6.6-7.8	0	High------	0.28	5	4	2-4
	16-24	15-30	1.30-1.40	0.6-2.0	0.20-0.22	7.4-8.4	0	Moderate	0.43			
	24-60	48-58	1.35-1.45	0.01-0.06	0.11-0.13	7.4-8.4	0	High------	0.32			
Lr:												
Lossing---------	0-8	40-55	1.30-1.35	0.06-0.2	0.12-0.14	6.6-7.8	0	Very high	0.28	5	4	2-3
	8-13	40-55	1.30-1.40	0.06-0.2	0.12-0.14	7.4-8.4	0	Very high	0.28			
	13-18	27-35	1.25-1.30	0.2-0.6	0.20-0.22	7.4-8.4	0	High------	0.32			
	18-72	15-24	1.40-1.50	0.6-6.0	0.20-0.22	7.4-8.4	0	Low-------	0.43			
	72-80	40-55	1.40-1.50	0.06-0.2	0.10-0.12	7.4-8.4	0	Very high	0.28			
Vore------------	0-8	40-55	1.30-1.35	0.06-0.2	0.12-0.14	7.4-8.4	0	High------	0.28	4	4	2-3
	8-23	28-35	1.30-1.35	0.6-2.0	0.19-0.22	7.4-8.4	0	Moderate	0.32			
	23-60	4-12	1.35-1.50	6.0-20	0.05-0.07	7.4-8.4	0	Low-------	0.10			
Lt, Lu----------- Luton	0-16	40-60	1.30-1.35	0.01-0.06	0.12-0.14	6.6-7.8	0	High------	0.28	5	4	3-5
	16-26	50-60	1.30-1.35	0.01-0.06	0.12-0.14	6.6-7.8	0	High------	0.28			
	26-60	40-60	1.35-1.45	0.01-0.06	0.11-0.13	6.6-8.4	0	High------	0.28			
McA-------------- Meckling	0-6	3-8	1.30-1.50	6.0-20	0.08-0.15	6.6-7.8	0-2	Low-------	0.17	5	2	.5-2
	6-54	1-8	1.30-1.50	6.0-20	0.06-0.10	7.4-8.4	0-2	Low-------	0.17			
	54-80	1-8	1.30-1.50	6.0-20	0.06-0.10	7.4-8.4	0-2	Low-------	0.15			
Mo--------------- Modale	0-25	10-18	1.20-1.30	0.6-2.0	0.21-0.23	7.4-8.4	0	Low-------	0.37	5	4L	1-3
	25-60	50-60	1.35-1.45	0.00-0.2	0.11-0.13	7.4-8.4	0	High------	0.28			
Na:												
Napa------------	0-1	15-25	1.15-1.25	0.6-2.0	0.16-0.18	6.6-8.4	0-2	Low-------	0.37	2	6	2-5
	1-33	45-60	1.20-1.30	0.00-0.06	0.13-0.18	7.4-9.0	4-16	Very high	0.37			
	33-80	35-50	1.25-1.35	0.00-0.06	0.11-0.16	7.4-9.0	2-8	High------	0.37			
Luton-----------	0-16	40-60	1.30-1.35	0.01-0.06	0.12-0.14	6.6-7.8	0	High------	0.28	5	4	3-5
	16-26	50-60	1.30-1.35	0.01-0.06	0.12-0.14	6.6-7.8	0	High------	0.28			
	26-60	40-60	1.35-1.45	0.01-0.06	0.11-0.13	6.6-8.4	0	High------	0.28			
Nb--------------- Norway	0-2	2-5	1.20-1.50	6.0-20	0.05-0.09	6.6-8.4	0-2	Low-------	0.17	5	2	0-1
	2-80	2-5	1.20-1.50	6.0-20	0.05-0.09	7.4-8.4	0-2	Low-------	0.15			
NcA:												
Norway----------	0-2	2-5	1.20-1.50	6.0-20	0.05-0.09	6.6-8.4	0-2	Low-------	0.17	5	2	0-2
	2-80	2-5	1.20-1.50	6.0-20	0.05-0.09	7.4-8.4	0-2	Low-------	0.15			
Meckling--------	0-6	3-8	1.30-1.50	6.0-20	0.08-0.15	6.6-7.8	0-2	Low-------	0.17	5	2	.5-2
	6-54	1-8	1.30-1.50	6.0-20	0.06-0.10	7.4-8.4	0-2	Low-------	0.17			
	54-80	1-8	1.30-1.50	6.0-20	0.06-0.10	7.4-8.4	0-2	Low-------	0.15			
Oa--------------- Onawa	0-7	40-55	1.30-1.35	0.2-0.6	0.12-0.14	7.4-8.4	0	High------	0.28	5	4	2-3
	7-25	50-60	1.30-1.40	0.06-0.2	0.12-0.14	7.4-8.4	0	High------	0.28			
	25-60	12-18	1.40-1.50	0.6-6.0	0.20-0.22	7.4-8.4	0	Low-------	0.43			
Ob:												
Onawa-----------	0-7	40-55	1.30-1.35	0.2-0.6	0.12-0.14	7.4-8.4	0	High------	0.28	5	4	2-3
	7-25	50-60	1.30-1.40	0.06-0.2	0.12-0.14	7.4-8.4	0	High------	0.28			
	25-60	12-18	1.40-1.50	0.6-6.0	0.20-0.22	7.4-8.4	0	Low-------	0.43			

Table 17.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
Ob:												
Owego-----------	0-16	40-50	1.30-1.35	0.01-0.06	0.12-0.14	6.6-7.8	0	High------	0.28	5	4	2-4
	16-24	15-30	1.30-1.40	0.6-2.0	0.20-0.22	7.4-8.4	0	Moderate	0.43			
	24-60	48-58	1.35-1.45	0.01-0.06	0.11-0.13	7.4-8.4	0	High------	0.32			
Oc--------------- Orthents	0-10	35-50	1.15-1.25	0.06-0.2	0.16-0.19	7.4-8.4	0-2	High------	0.28	5	4	2-5
	10-80	15-30	1.25-1.40	0.06-6.0	0.11-0.16	7.4-8.4	0-2	Moderate	0.32			
Og--------------- Orthents	0-10	10-20	1.25-1.40	2.0-6.0	0.11-0.20	6.1-7.8	0-2	Low-------	0.20	3	5	.5-2
	10-60	0-5	1.60-1.80	6.0-60	0.03-0.06	7.4-8.4	0-2	Low-------	0.10			
Om--------------- Orthents	0-8	27-35	1.20-1.50	0.2-0.6	0.18-0.23	6.6-8.4	0-2	Moderate	0.32	5	4L	1-3
	8-60	18-35	1.30-1.60	0.2-0.6	0.14-0.19	7.4-8.4	0-4	Moderate	0.37			
Os--------------- Orthents	0-10	5-12	1.60-1.70	6.0-20	0.10-0.12	5.6-7.3	0	Low-------	0.17	3	2	.5-2
	10-80	2-18	1.40-1.70	2.0-20	0.07-0.18	5.6-8.4	0	Low-------	0.17			
Ow--------------- Owego	0-16	40-50	1.30-1.35	0.01-0.06	0.12-0.14	6.6-7.8	0	High------	0.28	5	4	2-4
	16-24	15-30	1.30-1.40	0.6-2.0	0.20-0.22	7.4-8.4	0	Moderate	0.43			
	24-60	48-58	1.35-1.45	0.01-0.06	0.11-0.13	7.4-8.4	0	High------	0.32			
Pe--------------- Percival	0-7	40-60	1.30-1.35	0.06-0.2	0.10-0.12	7.4-8.4	0	Very high	0.28	4	4	1-3
	7-25	40-60	1.30-1.35	0.06-0.2	0.10-0.12	7.4-8.4	0	Very high	0.28			
	25-60	2-12	1.30-1.50	6.0-20	0.02-0.04	7.4-8.4	0	Low-------	0.15			
Ro--------------- Roxbury	0-12	18-27	1.30-1.45	0.6-2.0	0.22-0.24	6.6-8.4	0	Low-------	0.28	5	4L	2-4
	12-24	18-35	1.35-1.50	0.6-2.0	0.17-0.22	7.4-8.4	0	Moderate	0.43			
	24-60	18-35	1.35-1.50	0.6-2.0	0.17-0.22	7.4-8.4	0	Moderate	0.43			
Sa--------------- Salix	0-15	27-30	1.25-1.30	0.6-2.0	0.21-0.23	6.1-7.8	0	Moderate	0.28	5	7	3-4
	15-24	28-38	1.30-1.35	0.6-2.0	0.18-0.20	6.1-7.8	0	Moderate	0.43			
	24-60	16-22	1.35-1.45	0.6-2.0	0.20-0.22	6.6-8.4	0	Low-------	0.43			
Sd--------------- Salmo	0-24	27-35	1.15-1.25	0.2-0.6	0.19-0.24	6.6-8.4	4-16	Moderate	0.28	5	4L	3-6
	24-47	25-35	1.20-1.40	0.2-2.0	0.17-0.20	6.6-8.4	4-16	Moderate	0.28			
	47-60	27-45	1.40-1.70	0.06-0.6	0.11-0.20	6.6-8.4	4-16	Moderate	0.28			
SeB-------------- Sardak	0-6	2-5	1.20-1.50	6.0-20	0.05-0.09	6.6-8.4	0	Low-------	0.17	5	2	.5-1
	6-60	2-5	1.20-1.50	6.0-20	0.05-0.09	6.6-8.4	0	Low-------	0.15			
SkB:												
Sardak----------	0-6	2-5	1.20-1.50	6.0-20	0.05-0.09	6.6-8.4	0	Low-------	0.17	5	2	.5-1
	6-60	2-5	1.20-1.50	6.0-20	0.05-0.09	6.6-8.4	0	Low-------	0.15			
Scroll----------	0-8	40-55	1.30-1.35	0.06-0.2	0.10-0.12	7.4-8.4	0	High------	0.28	3	4	1-3
	8-11	18-30	1.30-1.35	0.6-2.0	0.20-0.22	7.4-8.4	0	Moderate	0.37			
	11-60	2-12	1.30-1.50	6.0-20	0.02-0.04	7.4-8.4	0	Low-------	0.15			
SpA, SpB:												
Scroll----------	0-8	40-55	1.30-1.35	0.06-0.2	0.10-0.12	7.4-8.4	0	High------	0.28	3	4	1-3
	8-11	18-30	1.30-1.35	0.6-2.0	0.20-0.22	7.4-8.4	0	Moderate	0.37			
	11-60	2-12	1.30-1.50	6.0-20	0.02-0.04	7.4-8.4	0	Low-------	0.15			
Percival--------	0-7	40-60	1.30-1.35	0.06-0.2	0.10-0.12	7.4-8.4	0	Very high	0.28	4	4	1-3
	7-25	40-60	1.30-1.35	0.06-0.2	0.10-0.12	7.4-8.4	0	Very high	0.28			
	25-60	2-12	1.30-1.50	6.0-20	0.02-0.04	7.4-8.4	0	Low-------	0.15			
TaE:												
Talmo-----------	0-9	18-25	1.20-1.45	0.6-2.0	0.18-0.20	6.6-7.8	0-2	Low-------	0.20	2	5	1-3
	9-60	0-10	1.45-1.65	6.0-60	0.03-0.06	7.4-8.4	0-2	Low-------	0.05			

Table 17.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
TaE:												
Thurman---------	0-19	5-12	1.35-1.55	6.0-20	0.10-0.12	5.6-7.3	0	Low-------	0.17	5	2	1-2
	19-36	5-12	1.55-1.75	6.0-20	0.09-0.11	5.6-7.3	0	Low-------	0.17			
	36-60	2-7	1.60-1.80	6.0-20	0.06-0.08	5.6-7.3	0	Low-------	0.15			
Te---------------	0-12	20-27	1.10-1.25	0.6-2.0	0.19-0.22	5.6-7.3	0-2	Moderate	0.37	5	6	4-8
Tetonka	12-20	25-35	1.15-1.25	0.2-0.6	0.19-0.22	5.6-7.3	0-2	Moderate	0.37			
	20-31	35-60	1.20-1.35	0.06-0.2	0.13-0.19	6.1-7.8	0-2	High------	0.28			
	31-60	30-50	1.35-1.50	0.06-0.6	0.11-0.17	6.6-8.4	2-8	High------	0.32			
ThA, ThB, ThC----	0-19	5-12	1.35-1.55	6.0-20	0.10-0.12	5.6-7.3	0	Low-------	0.17	5	2	1-2
Thurman	19-36	5-12	1.55-1.75	6.0-20	0.09-0.11	5.6-7.3	0	Low-------	0.17			
	36-60	2-7	1.60-1.80	6.0-20	0.06-0.08	5.6-7.3	0	Low-------	0.15			
Tr:												
Ticonic---------	0-9	2-10	1.20-1.50	6.0-20	0.05-0.09	6.6-8.4	---	Low-------	0.17	5	2	.5-1
	9-13	2-5	1.20-1.50	>6.0	0.05-0.09	6.6-8.4	<2	Low-------	0.15			
	13-26	12-24	1.35-1.50	0.6-2.0	0.20-0.22	7.4-8.4	<2	Low-------	0.24			
	26-80	6-18	1.35-1.60	2.0-6.0	0.11-0.17	7.4-8.4	<2	Low-------	0.10			
Grable----------	0-8	18-27	1.20-1.25	0.6-2.0	0.22-0.24	7.4-8.4	0	Low-------	0.32	4	4L	1-3
	8-26	12-16	1.25-1.50	0.6-2.0	0.20-0.22	7.4-8.4	0	Low-------	0.43			
	26-60	2-10	1.20-1.50	6.0-20	0.02-0.07	7.4-8.4	0	Low-------	0.15			
TtA:												
Trent-----------	0-17	27-35	1.15-1.25	0.6-2.0	0.19-0.22	5.6-7.3	0-2	Moderate	0.28	5	7	4-8
	17-28	27-35	1.20-1.35	0.6-2.0	0.17-0.20	6.1-7.3	0-2	Moderate	0.32			
	28-47	25-33	1.25-1.40	0.6-2.0	0.17-0.20	6.1-7.3	0-2	Moderate	0.43			
	47-52	20-30	1.30-1.45	0.6-2.0	0.17-0.20	7.4-8.4	0-2	Moderate	0.43			
	52-60	20-30	1.30-1.45	0.6-2.0	0.17-0.20	6.6-8.4	2-4	Moderate	0.43			
Tetonka---------	0-12	20-27	1.10-1.25	0.6-2.0	0.19-0.22	5.6-7.3	0-2	Moderate	0.37	5	6	4-8
	12-20	25-35	1.15-1.25	0.2-0.6	0.19-0.22	5.6-7.3	0-2	Moderate	0.37			
	20-31	35-60	1.20-1.35	0.06-0.2	0.13-0.19	6.1-7.8	0-2	High------	0.28			
	31-60	30-50	1.35-1.50	0.06-0.6	0.11-0.17	6.6-8.4	2-8	High------	0.32			
Wakonda---------	0-9	20-30	1.15-1.30	0.6-2.0	0.19-0.22	6.6-8.4	2-4	Moderate	0.28	5	4L	2-5
	9-35	20-33	1.20-1.35	0.6-2.0	0.14-0.17	7.4-8.4	2-4	Moderate	0.43			
	35-62	20-30	1.30-1.50	0.6-2.0	0.16-0.20	7.4-8.4	4-8	Moderate	0.43			
	62-80	25-34	1.50-1.70	0.2-0.6	0.16-0.20	7.4-8.4	2-4	Moderate	0.37			
TwA:												
Trent-----------	0-17	27-35	1.15-1.25	0.6-2.0	0.19-0.22	5.6-7.3	0-2	Moderate	0.28	5	7	4-8
	17-28	27-35	1.20-1.35	0.6-2.0	0.17-0.20	6.1-7.3	0-2	Moderate	0.32			
	28-47	25-33	1.25-1.40	0.6-2.0	0.17-0.20	6.1-7.3	0-2	Moderate	0.43			
	47-52	20-30	1.30-1.45	0.6-2.0	0.17-0.20	7.4-8.4	0-2	Moderate	0.43			
	52-60	20-30	1.30-1.45	0.6-2.0	0.17-0.20	6.6-8.4	2-4	Moderate	0.43			
Wentworth-------	0-7	27-35	1.15-1.25	0.6-2.0	0.19-0.22	5.6-7.3	0-2	Moderate	0.28	5	7	3-5
	7-31	25-35	1.20-1.35	0.6-2.0	0.18-0.21	6.1-7.3	0-2	Moderate	0.43			
	31-49	20-30	1.30-1.45	0.6-2.0	0.17-0.20	7.4-8.4	0-2	Moderate	0.43			
	49-60	25-34	1.50-1.70	0.2-0.6	0.16-0.20	7.4-8.4	2-4	Moderate	0.37			
Wa:												
Wakonda---------	0-9	20-30	1.15-1.30	0.6-2.0	0.19-0.22	6.6-8.4	2-4	Moderate	0.28	5	4L	2-5
	9-35	20-33	1.20-1.35	0.6-2.0	0.14-0.17	7.4-8.4	2-4	Moderate	0.43			
	35-62	20-30	1.30-1.50	0.6-2.0	0.16-0.20	7.4-8.4	4-8	Moderate	0.43			
	62-80	25-34	1.50-1.70	0.2-0.6	0.16-0.20	7.4-8.4	2-4	Moderate	0.37			

Table 17.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
Wa:												
Tetonka---------	0-12	20-27	1.10-1.25	0.6-2.0	0.19-0.22	5.6-7.3	0-2	Moderate	0.37	5	6	4-8
	12-20	25-35	1.15-1.25	0.2-0.6	0.19-0.22	5.6-7.3	0-2	Moderate	0.37			
	20-31	35-60	1.20-1.35	0.06-0.2	0.13-0.19	6.1-7.8	0-2	High------	0.28			
	31-60	30-50	1.35-1.50	0.06-0.6	0.11-0.17	6.6-8.4	2-8	High------	0.32			
Wc:												
Wakonda---------	0-9	20-30	1.15-1.30	0.6-2.0	0.19-0.22	6.6-8.4	2-4	Moderate	0.28	5	4L	2-5
	9-35	20-33	1.20-1.35	0.6-2.0	0.14-0.17	7.4-8.4	2-4	Moderate	0.43			
	35-62	20-30	1.30-1.50	0.6-2.0	0.16-0.20	7.4-8.4	4-8	Moderate	0.43			
	62-80	25-34	1.50-1.70	0.2-0.6	0.16-0.20	7.4-8.4	2-4	Moderate	0.37			
Wentworth-------	0-7	27-35	1.15-1.25	0.6-2.0	0.19-0.22	5.6-7.3	0-2	Moderate	0.28	5	7	3-5
	7-31	25-35	1.20-1.35	0.6-2.0	0.18-0.21	6.1-7.3	0-2	Moderate	0.43			
	31-49	20-30	1.30-1.45	0.6-2.0	0.17-0.20	7.4-8.4	0-2	Moderate	0.43			
	49-60	25-34	1.50-1.70	0.2-0.6	0.16-0.20	7.4-8.4	2-4	Moderate	0.37			
Whitewood-------	0-14	27-34	1.15-1.25	0.2-0.6	0.19-0.22	6.1-7.3	0	Moderate	0.28	5	7	4-8
	14-32	25-34	1.20-1.35	0.2-0.6	0.19-0.22	6.1-7.8	0	Moderate	0.28			
	32-48	25-34	1.20-1.35	0.2-0.6	0.17-0.20	7.4-8.4	0-2	Moderate	0.43			
	48-60	25-40	1.35-1.50	0.2-0.6	0.17-0.20	7.4-8.4	0-4	Moderate	0.43			
Wd:												
Wakonda---------	0-9	20-30	1.15-1.30	0.6-2.0	0.19-0.22	6.6-8.4	2-4	Moderate	0.28	5	4L	2-5
	9-35	20-33	1.20-1.35	0.6-2.0	0.14-0.17	7.4-8.4	2-4	Moderate	0.43			
	35-62	20-30	1.30-1.50	0.6-2.0	0.16-0.20	7.4-8.4	4-8	Moderate	0.43			
	62-80	25-34	1.50-1.70	0.2-0.6	0.16-0.20	7.4-8.4	2-4	Moderate	0.37			
Whitewood-------	0-14	27-34	1.15-1.25	0.2-0.6	0.19-0.22	6.1-7.3	0	Moderate	0.28	5	7	4-8
	14-32	25-34	1.20-1.35	0.2-0.6	0.19-0.22	6.1-7.8	0	Moderate	0.28			
	32-48	25-34	1.20-1.35	0.2-0.6	0.17-0.20	7.4-8.4	0-2	Moderate	0.43			
	48-60	25-40	1.35-1.50	0.2-0.6	0.17-0.20	7.4-8.4	0-4	Moderate	0.43			
WkB:												
Wentworth-------	0-7	27-35	1.15-1.25	0.6-2.0	0.19-0.22	5.6-7.3	0-2	Moderate	0.28	5	7	3-5
	7-31	25-35	1.20-1.35	0.6-2.0	0.18-0.21	6.1-7.3	0-2	Moderate	0.43			
	31-49	20-30	1.30-1.45	0.6-2.0	0.17-0.20	7.4-8.4	0-2	Moderate	0.43			
	49-60	25-34	1.50-1.70	0.2-0.6	0.16-0.20	7.4-8.4	2-4	Moderate	0.37			
Trent-----------	0-17	27-35	1.15-1.25	0.6-2.0	0.19-0.22	5.6-7.3	0-2	Moderate	0.28	5	7	4-8
	17-28	27-35	1.20-1.35	0.6-2.0	0.17-0.20	6.1-7.3	0-2	Moderate	0.32			
	28-47	25-33	1.25-1.40	0.6-2.0	0.17-0.20	6.1-7.3	0-2	Moderate	0.43			
	47-52	20-30	1.30-1.45	0.6-2.0	0.17-0.20	7.4-8.4	0-2	Moderate	0.43			
	52-60	20-30	1.30-1.45	0.6-2.0	0.17-0.20	6.6-8.4	2-4	Moderate	0.43			
Wm-------------- Whitewood	0-14	27-34	1.15-1.25	0.2-0.6	0.19-0.22	6.1-7.3	0	Moderate	0.28	5	7	4-8
	14-32	25-34	1.20-1.35	0.2-0.6	0.19-0.22	6.1-7.8	0	Moderate	0.28			
	32-48	25-34	1.20-1.35	0.2-0.6	0.17-0.20	7.4-8.4	0-2	Moderate	0.43			
	48-60	25-40	1.35-1.50	0.2-0.6	0.17-0.20	7.4-8.4	0-4	Moderate	0.43			
Wo-------------- Worthing	0-18	35-40	1.15-1.25	0.2-0.6	0.19-0.22	5.6-7.3	0-2	High------	0.37	5	4	4-8
	18-53	40-60	1.25-1.40	0.06-0.2	0.13-0.18	6.1-7.3	0-2	High------	0.28			
	53-60	30-50	1.35-1.50	0.2-0.6	0.11-0.17	6.6-8.4	2-8	High------	0.32			
Wp-------------- Worthing	0-18	30-40	1.15-1.25	0.2-0.6	0.19-0.22	5.6-7.3	0-2	High------	0.37	5	8	4-8
	18-53	40-60	1.20-1.35	0.06-0.2	0.13-0.18	6.1-7.8	0-2	High------	0.28			
	53-60	30-50	1.35-1.50	0.2-0.6	0.11-0.17	6.6-8.4	2-8	High------	0.32			

Table 18.--Soil and Water Features

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft					
Ac---------------- Albaton	D	Very rare---	---	---	0-3.0	Apparent	Nov-Jul	Moderate	High-----	Low.
Ad---------------- Albaton	D	Very rare---	---	Nov-Jun	+1-3.0	Apparent	Nov-Jun	High-----	High-----	Low.
AeA--------------- Alcester	B	Rare--------	---	---	3.0-6.0	Apparent	Oct-Jun	High-----	Moderate	Low.
Ba---------------- Baltic	D	Occasional	Long------	Mar-Sep	0-1.5	Apparent	Jan-Dec	High-----	High-----	Moderate.
Bb---------------- Blake	B	Very rare---	---	---	3.0-5.0	Apparent	Nov-Jul	High-----	High-----	Low.
Bf---------------- Blencoe	D	Very rare---	---	---	1.5-3.0	Apparent	Nov-Jul	High-----	High-----	Low.
Bg---------------- Blyburg	B	Very rare---	---	---	>6.0	---	---	High-----	Low------	Low.
Bk:										
Blyburg-----------	B	Very rare---	---	---	>6.0	---	---	High-----	Low------	Low.
Gayville----------	D	Very rare---	---	---	1.5-3.0	Apparent	Oct-Jun	Moderate	High-----	Moderate.
Bm---------------- Bon	B	Rare--------	---	Apr-Oct	>6.0	---	---	Moderate	Moderate	Low.
Bn---------------- Bon	B	Frequent----	Brief-----	Apr-Oct	3.0-5.0	Apparent	Oct-Jul	High-----	Moderate	Low.
Ca:										
Chancellor--------	C	Frequent----	Brief-----	Mar-Oct	1.0-2.0	Apparent	Mar-Jun	High-----	High-----	Moderate.
Tetonka-----------	C/D	None--------	---	---	+1-1.0	Perched	Jan-Dec	High-----	High-----	Moderate.
Cc---------------- Chaska	B/D	Frequent----	Long------	Mar-Jun	1.5-2.5	Apparent	Nov-Jun	High-----	High-----	Low.
Cd---------------- Clamo	C/D	Occasional	Long------	Mar-Jun	0.5-1.5	Apparent	Oct-Jun	High-----	High-----	High.
DaA--------------- Dalesburg	B	Occasional	Brief-----	Mar-Nov	3.0-6.0	Apparent	Mar-Jun	Low------	Moderate	Low.
DbB:										
Dalesburg---------	B	Occasional	Brief-----	Mar-Nov	3.0-6.0	Apparent	Mar-Jun	Low------	Moderate	Low.
Dimo--------------	B	Occasional	Long------	Mar-Oct	1.5-3.0	Apparent	Mar-Jun	High-----	High-----	Low.
DcA--------------- Davis	B	Rare--------	---	---	3.0-5.0	Apparent	Mar-Jun	Moderate	Moderate	Low.

Table 18.--Soil and Water Features--Continued

Soil name and map symbol	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft					
DcB-------------- Davis	B	None--------	---	---	>6.0	---	---	Moderate	Moderate	Low.
DhA:										
Davison----------	B	None--------	---	---	2.0-4.0	Perched	Apr-Jun	High-----	High-----	Moderate.
Chancellor-------	C	Frequent----	Brief-----	Mar-Oct	1.0-2.0	Apparent	Mar-Jun	High-----	High-----	Moderate.
DkA:										
Davison----------	B	None--------	---	---	2.0-4.0	Perched	Apr-Jun	High-----	High-----	Moderate.
Tetonka----------	D	None--------	---	---	+1-1.0	Perched	Jan-Dec	High-----	High-----	Moderate.
Egan-------------	B	None--------	---	---	>6.0	---	---	High-----	High-----	Moderate.
DmB:										
Delmont----------	B	None--------	---	---	>6.0	---	---	Low------	Moderate	Low.
Enet-------------	B	None--------	---	---	>6.0	---	---	Low------	Moderate	Low.
DnD:										
Delmont----------	B	None--------	---	---	>6.0	---	---	Low------	Moderate	Low.
Talmo------------	A	None--------	---	---	>6.0	---	---	Low------	Moderate	Low.
Do--------------- Dimo	B	Occasional	Long------	Mar-Oct	1.5-3.0	Apparent	Mar-Jun	High-----	High-----	Low.
EaA:										
Egan-------------	B	None--------	---	---	>6.0	---	---	High-----	High-----	Moderate.
Chancellor-------	C	Frequent----	Brief-----	Mar-Oct	1.0-2.0	Apparent	Mar-Jun	High-----	High-----	Moderate.
Davison----------	B	None--------	---	---	2.0-4.0	Perched	Apr-Jun	High-----	High-----	Moderate.
EbA:										
Egan-------------	B	None--------	---	---	>6.0	---	---	High-----	High-----	Moderate.
Clarno-----------	B	None--------	---	---	>6.0	---	---	Moderate	High-----	Moderate.
Chancellor-------	C	Frequent----	Brief-----	Mar-Oct	1.0-2.0	Apparent	Mar-Jun	High-----	High-----	Moderate.
EcA:										
Egan-------------	B	None--------	---	---	>6.0	---	---	High-----	High-----	Moderate.
Clarno-----------	B	None--------	---	---	>6.0	---	---	Moderate	High-----	Moderate.
Tetonka----------	D	None--------	---	---	+1-1.0	Perched	Jan-Dec	High-----	High-----	Moderate.
EdA, EdB:										
Egan-------------	B	None--------	---	---	>6.0	---	---	High-----	High-----	Moderate.
Clarno-----------	B	None--------	---	---	>6.0	---	---	Moderate	High-----	Moderate.
Trent------------	B	None--------	---	---	3.5-5.0	Perched	Mar-Jun	High-----	Moderate	Low.
EeB:										
Egan-------------	B	None--------	---	---	>6.0	---	---	High-----	High-----	Moderate.
Ethan------------	B	None--------	---	---	>6.0	---	---	Moderate	Moderate	Moderate.

Table 18.--Soil and Water Features--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months		Uncoated steel	Concrete
					Ft					
EfB:										
Egan	B	None	---	---	>6.0	---	---	High	High	Moderate.
Ethan	B	None	---	---	>6.0	---	---	Moderate	Moderate	Moderate.
Tetonka	D	None	---	---	+1-1.0	Perched	Jan-Dec	High	High	Moderate.
EgB:										
Egan	B	None	---	---	>6.0	---	---	High	High	Moderate.
Ethan	B	None	---	---	>6.0	---	---	Moderate	Moderate	Moderate.
Trent	B	None	---	---	3.5-5.0	Perched	Mar-Jun	High	Moderate	Low.
EhA, EhB:										
Egan	B	None	---	---	>6.0	---	---	High	High	Moderate.
Trent	B	None	---	---	3.5-5.0	Perched	Mar-Jun	High	Moderate	Low.
Ek:										
Egan	B	None	---	---	>6.0	---	---	High	High	Moderate.
Trent	B	None	---	---	3.5-5.0	Perched	Mar-Jun	High	Moderate	Low.
Chancellor	C	Frequent	Brief	Mar-Oct	1.0-2.0	Apparent	Mar-Jun	High	High	Moderate.
Em Enet	B	Rare	---	---	4.0-6.0	Apparent	Mar-Jun	Low	Moderate	Low.
EnB:										
Enet	B	None	---	---	>6.0	---	---	Low	Moderate	Low.
Storla	B	None	---	---	2.0-4.0	Perched	Mar-May	High	High	Moderate.
Tetonka	D	None	---	---	+1-1.0	Perched	Jan-Dec	High	High	Moderate.
EoD, EoE:										
Ethan	B	None	---	---	>6.0	---	---	Moderate	Moderate	Moderate.
Betts	B	None	---	---	>6.0	---	---	Moderate	High	Moderate.
EpD, EpE:										
Ethan	B	None	---	---	>6.0	---	---	Moderate	Moderate	Moderate.
Bon	B	Frequent	Brief	Apr-Oct	3.0-5.0	Apparent	Oct-Jul	High	Moderate	Low.
ErC, ErD:										
Ethan	B	None	---	---	>6.0	---	---	Moderate	Moderate	Moderate.
Clarno	B	None	---	---	>6.0	---	---	Moderate	High	Moderate.
EsB:										
Ethan	B	None	---	---	>6.0	---	---	Moderate	Moderate	Moderate.
Clarno	B	None	---	---	>6.0	---	---	Moderate	High	Moderate.
Bon	B	Occasional	Brief	Apr-Oct	>6.0	---	---	Moderate	Moderate	Low.

Table 18.--Soil and Water Features--Continued

Soil name and map symbol	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft					
EtC:										
Ethan	B	None	---	---	>6.0	---	---	Moderate	Moderate	Moderate.
Clarno	B	None	---	---	>6.0	---	---	Moderate	High	Moderate.
Bon	B	Rare	---	Apr-Oct	3.0-5.0	Apparent	Oct-Jul	High	Moderate	Low.
EuB:										
Ethan	B	None	---	---	>6.0	---	---	Moderate	Moderate	Moderate.
Davison	B	None	---	---	2.0-4.0	Perched	Apr-Jun	High	High	Moderate.
Tetonka	D	None	---	---	+1-1.0	Perched	Jan-Dec	High	High	Moderate.
EvC:										
Ethan	B	None	---	---	>6.0	---	---	Moderate	Moderate	Moderate.
Egan	B	None	---	---	>6.0	---	---	High	High	Moderate.
EzE:										
Ethan	B	None	---	---	>6.0	---	---	Moderate	Moderate	Moderate.
Talmo	A	None	---	---	>6.0	---	---	Low	Moderate	Low.
Fo Forney	D	Very rare	---	---	1.5-3.0	Apparent	Nov-Jul	Moderate	High	Low.
Ga Grable	B	Very rare	---	---	>6.0	---	---	Low	Low	Low.
Gt:										
Grable	B	Very rare	---	---	>6.0	---	---	Low	Low	Low.
Ticonic	A	Very rare	---	---	>6.0	---	---	Low	Low	Low.
Vore	B	Very rare	---	---	3.0-5.0	Apparent	Nov-Jul	High	High	Low.
Gv:										
Grable	B	Very rare	---	---	>6.0	---	---	Low	Low	Low.
Vore	B	Very rare	---	---	3.0-5.0	Apparent	Nov-Jul	High	High	Low.
Haynie	B	Very rare	---	---	>6.0	---	---	High	Low	Low.
Ha Haynie	B	Very rare	---	---	>6.0	---	---	High	Low	Low.
Hg:										
Haynie	B	Very rare	---	---	>6.0	---	---	High	Low	Low.
Grable	B	Very rare	---	---	>6.0	---	---	Low	Low	Low.
Hn:										
Haynie	B	Very rare	---	---	>6.0	---	---	High	Low	Low.
Lossing	D	Very rare	---	---	3.0-5.0	Apparent	Nov-Jul	High	High	Low.
Grable	B	Very rare	---	---	>6.0	---	---	Low	Low	Low.

Table 18.--Soil and Water Features--Continued

Soil name and map symbol	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft					
Ho:										
Haynie	B	Very rare	---	---	>6.0	---	---	High	Low	Low.
Onawa	C/D	Very rare	---	---	3.0-5.0	Apparent	Nov-Jul	High	High	Low.
Blake	B	Very rare	---	---	3.0-5.0	Apparent	Nov-Jul	High	High	Low.
Ja: James	D	Frequent	Long	Mar-Oct	0-1.0	Apparent	Oct-Jun	High	High	High.
La: Lakeport	B	Very rare	---	---	3.0-5.0	Apparent	Nov-Jul	High	High	Low.
Lb: Lamo	C	Occasional	Brief	Mar-Aug	1.5-3.0	Apparent	Nov-May	High	High	Low.
Lc: Lamo	C	Occasional	Brief	Mar-Apr	1.5-3.0	Apparent	Mar-Apr	High	High	Moderate.
Ld:										
Lamo	C	Occasional	Brief	Mar-Aug	1.5-3.0	Apparent	Nov-May	High	High	Low.
Baltic	D	Occasional	Long	Mar-Sep	0-1.5	Apparent	Jan-Dec	High	High	Moderate.
Le: Lex	B	Occasional	Brief	Apr-Jul	1.5-3.0	Apparent	Nov-May	High	High	Low.
Lg: Lossing	D	Very rare	---	---	3.0-5.0	Apparent	Nov-Jul	High	High	Low.
Lo:										
Lossing	D	Very rare	---	---	3.0-5.0	Apparent	Nov-Jul	High	High	Low.
Owego	D	Very rare	---	---	1.5-3.0	Apparent	Nov-Jul	Moderate	High	Low.
Lr:										
Lossing	D	Very rare	---	---	3.0-5.0	Apparent	Nov-Jul	High	High	Low.
Vore	B	Very rare	---	---	3.0-5.0	Apparent	Nov-Jul	High	High	Low.
Lt: Luton	D	Occasional	Long	Mar-Sep	0-1.0	Apparent	Nov-Jul	Moderate	High	Low.
Lu: Luton	D	Rare	---	---	0-1.0	Apparent	Nov-Jul	Moderate	High	Low.
McA: Meckling	B	Rare	---	---	2.5-4.0	Apparent	Nov-Jun	Low	Moderate	Low.
Mo: Modale	C	Very rare	---	---	3.0-5.0	Perched	Nov-Jul	High	High	Low.
Na:										
Napa	D	Rare	---	---	0-3.0	Perched	Nov-Jul	Moderate	High	Moderate.
Luton	D	Rare	---	---	0-1.0	Apparent	Nov-Jul	Moderate	High	Low.
Nb: Norway	D	Frequent	Long	Mar-Nov	0-1.0	Apparent	Oct-May	High	Low	Low.

Table 18.--Soil and Water Features--Continued

Soil name and map symbol	Hydro- logic group	Flooding			High water table			Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months		Uncoated steel	Concrete
					Ft					
NcA:										
Norway-----------	D	Occasional	Long------	Mar-Nov	0-1.5	Apparent	Oct-May	High-----	Low------	Low.
Meckling---------	B	Rare--------	---	---	2.5-4.0	Apparent	Nov-Jun	Low------	Moderate	Low.
Oa---------------- Onawa	C/D	Very rare---	---	---	3.0-5.0	Apparent	Nov-Jul	High-----	High-----	Low.
Ob:										
Onawa------------	C/D	Very rare---	---	---	3.0-5.0	Apparent	Nov-Jul	High-----	High-----	Low.
Owego------------	D	Very rare---	---	---	1.5-3.0	Apparent	Nov-Jul	Moderate	High-----	Low.
Oc---------------- Orthents	C	Frequent----	Long------	Mar-Oct	0-6.0	Apparent	Mar-Oct	Moderate	High-----	Low.
Og---------------- Orthents	A	None--------	---	---	>6.0	---	---	Low------	Moderate	Low.
Om---------------- Orthents	B	None--------	---	---	>6.0	---	---	Moderate	Moderate	Low.
Os---------------- Orthents	A	None--------	---	---	>6.0	---	---	Low------	Low------	Low.
Ow---------------- Owego	D	Very rare---	---	---	1.5-3.0	Apparent	Nov-Jul	Moderate	High-----	Low.
Pe---------------- Percival	C	Very rare---	---	---	3.0-5.0	Apparent	Nov-Jul	Moderate	High-----	Low.
Ro---------------- Roxbury	B	Frequent----	Very brief	Apr-Sep	3.0-6.0	Apparent	Oct-Jul	Moderate	Low------	Low.
Sa---------------- Salix	B	Very rare---	---	---	4.0-6.0	Apparent	Nov-Jul	High-----	Moderate	Low.
Sd---------------- Salmo	C/D	Occasional	Brief-----	Mar-Jun	0-1.5	Apparent	Sep-Jun	High-----	High-----	High.
SeB--------------- Sardak	A	Very rare---	---	---	>6.0	---	---	Low------	Low------	Low.
SkB:										
Sardak-----------	A	Very rare---	---	---	>6.0	---	---	Low------	Low------	Low.
Scroll-----------	C	Very rare---	---	---	3.0-5.0	Apparent	Nov-Jul	Moderate	High-----	Low.
SpA, SpB:										
Scroll-----------	C	Very rare---	---	---	3.0-5.0	Apparent	Nov-Jul	Moderate	High-----	Low.
Percival---------	C	Very rare---	---	---	3.0-5.0	Apparent	Nov-Jul	Moderate	High-----	Low.
TaE:										
Talmo------------	A	None--------	---	---	>6.0	---	---	Low------	Moderate	Low.
Thurman----------	A	None--------	---	---	>6.0	---	---	Low------	Low------	Low.
Te---------------- Tetonka	D	None--------	---	---	+1-1.0	Perched	Jan-Dec	High-----	High-----	Moderate.

Table 18.--Soil and Water Features--Continued

Soil name and map symbol	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft					
ThA, ThB, ThC----- Thurman	A	None--------	---	---	>6.0	---	---	Low------	Low------	Low.
Tr:										
Ticonic----------	A	Very rare---	---	---	>6.0	---	---	Low------	Low------	Low.
Grable-----------	B	Very rare---	---	---	>6.0	---	---	Low------	Low------	Low.
TtA:										
Trent------------	B	None--------	---	---	3.5-5.0	Perched	Mar-Jun	High-----	Moderate	Low.
Tetonka----------	D	None--------	---	---	+1-1.0	Perched	Jan-Dec	High-----	High-----	Moderate.
Wakonda----------	B	None--------	---	---	1.0-3.0	Perched	Mar-Jun	High-----	High-----	Moderate.
TwA:										
Trent------------	B	None--------	---	---	3.5-5.0	Perched	Mar-Jun	High-----	Moderate	Low.
Wentworth--------	B	None--------	---	---	>6.0	---	---	High-----	High-----	Low.
Wa:										
Wakonda----------	B	None--------	---	---	1.0-3.0	Perched	Mar-Jun	High-----	High-----	Moderate.
Tetonka----------	D	None--------	---	---	+1-1.0	Perched	Jan-Dec	High-----	High-----	Moderate.
Wc:										
Wakonda----------	B	None--------	---	---	1.0-3.0	Perched	Mar-Jun	High-----	High-----	Moderate.
Wentworth--------	B	None--------	---	---	>6.0	---	---	High-----	High-----	Low.
Whitewood--------	C/D	Occasional	Very brief	Mar-Oct	1.0-2.0	Apparent	Sep-Jun	High-----	High-----	Low.
Wd:										
Wakonda----------	B	None--------	---	---	1.0-3.0	Perched	Mar-Jun	High-----	High-----	Moderate.
Whitewood--------	C/D	Occasional	Very brief	Mar-Oct	1.0-2.0	Apparent	Sep-Jun	High-----	High-----	Low.
WkB:										
Wentworth--------	B	None--------	---	---	>6.0	---	---	High-----	High-----	Low.
Trent------------	B	None--------	---	---	3.5-5.0	Perched	Mar-Jun	High-----	Moderate	Low.
Wm---------------- Whitewood	C/D	Occasional	Very brief	Mar-Oct	1.0-2.0	Apparent	Sep-Jun	High-----	High-----	Low.
Wo---------------- Worthing	D	None--------	---	---	+2-1.0	Perched	Jan-Dec	High-----	High-----	Moderate.
Wp---------------- Worthing	D	None--------	---	---	+3-0.5	Perched	Jan-Dec	High-----	High-----	High.

Table 19.--Classification of the Soils

(An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series)

Soil name	Family or higher taxonomic class
Albaton	Very fine, montmorillonitic (calcareous), mesic Vertic Fluvaquents
Alcester	Fine-silty, mixed, mesic Cumulic Haplustolls
Baltic	Fine, montmorillonitic (calcareous), mesic Cumulic Vertic Endoaquolls
Betts	Fine-loamy, mixed (calcareous), mesic Typic Ustorthents
Blake	Fine-silty, mixed (calcareous), mesic Aquic Udifluvents
*Blencoe	Clayey over loamy, montmorillonitic, mesic Aquertic Hapludolls
Blyburg	Coarse-silty, mixed, mesic Fluventic Hapludolls
Bon	Fine-loamy, mixed, mesic Cumulic Haplustolls
Chancellor	Fine, montmorillonitic, mesic Vertic Argiaquolls
Chaska	Fine-loamy, mixed (calcareous), mesic Aeric Fluvaquents
Clamo	Fine, montmorillonitic, mesic Cumulic Vertic Endoaquolls
Clarno	Fine-loamy, mixed, mesic Typic Haplustolls
Dalesburg	Coarse-loamy, mixed, mesic Pachic Haplustolls
Davis	Fine-loamy, mixed, mesic Pachic Haplustolls
Davison	Fine-loamy, mixed, mesic Aquic Calciustolls
Delmont	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Typic Haplustolls
Dimo	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Pachic Haplustolls
Egan	Fine-silty, mixed, mesic Udic Haplustolls
Enet	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Pachic Haplustolls
Ethan	Fine-loamy, mixed, mesic Typic Calciustolls
Forney	Fine, montmorillonitic, nonacid, mesic Vertic Fluvaquents
Gayville	Fine, montmorillonitic, mesic Leptic Natrustolls
Grable	Coarse-silty over sandy or sandy-skeletal, mixed (calcareous), mesic Mollic Udifluvents
Haynie	Coarse-silty, mixed (calcareous), mesic Mollic Udifluvents
James	Fine, montmorillonitic (calcareous), mesic Cumulic Vertic Endoaquolls
Lakeport	Fine, montmorillonitic, mesic Aquic Hapludolls
Lamo	Fine-silty, mixed (calcareous), mesic Cumulic Endoaquolls
Lex	Fine-loamy over sandy or sandy-skeletal, mixed (calcareous), mesic Fluvaquentic Endoaquolls
Lossing	Fine-silty, mixed (calcareous), mesic Aquic Udifluvents
Luton	Very fine, montmorillonitic, mesic Vertic Endoaquolls
Meckling	Mixed, mesic Aquic Udipsamments
Modale	Coarse-silty over clayey, mixed (calcareous), mesic Aquic Udifluvents
Napa	Fine, montmorillonitic, mesic Typic Natraquerts
Norway	Mixed, mesic Typic Psammaquents
Onawa	Clayey over loamy, montmorillonitic (calcareous), mesic Aquic Udifluvents
Orthents	Orthents
Owego	Fine, montmorillonitic, nonacid, mesic Mollic Fluvaquents
Percival	Clayey over sandy or sandy-skeletal, montmorillonitic (calcareous), mesic Aquic Udifluvents
Roxbury	Fine-silty, mixed, mesic Cumulic Haplustolls
Salix	Fine-silty, mixed, mesic Typic Hapludolls
Salmo	Fine-silty, mixed (calcareous), mesic Cumulic Endoaquolls
Sardak	Mixed, mesic Typic Udipsamments
Scroll	Fine-silty over sandy or sandy-skeletal, mixed (calcareous), mesic Aquic Udifluvents
Storla	Fine-loamy over sandy or sandy-skeletal, mesic Aeric Calciaquolls
Talmo	Sandy-skeletal, mixed, mesic Udorthentic Haplustolls
Tetonka	Fine, montmorillonitic, mesic Argiaquic Argialbolls
Thurman	Sandy, mixed, mesic Udorthentic Haplustolls
Ticonic	Sandy over loamy, mixed (calcareous), mesic Typic Udifluvents
Trent	Fine-silty, mixed, mesic Pachic Haplustolls
Vore	Fine-silty over sandy or sandy-skeletal, mixed (calcareous), mesic Aquic Udifluvents
Wakonda	Fine-silty, mixed, mesic Aeric Calciaquolls
Wentworth	Fine-silty, mixed, mesic Udic Haplustolls
Whitewood	Fine-silty, mixed, mesic Cumulic Endoaquolls
Worthing	Fine, montmorillonitic, mesic Vertic Argiaquolls

Interpretive Groups

Interpretive Groups

(Absence of an entry indicates that the soil is not assigned to the interpretive group)

Map symbol	Soil name	Land capability classification	Range site	Windbreak suitability group	Pasture suitability group
Ac	Albaton-----------	IIIw	Clayey Overflow----	2K	A
Ad	Albaton-----------	Vw	Wetland-----------	10	B2
AeA	Alcester----------	I	Loamy Overflow-----	1	K
Ba	Baltic------------	IIIw	Clayey Overflow----	2K	A
Bb	Blake-------------	I	Silty-------------	1K	F
Bf	Blencoe-----------	IIw	Clayey Overflow----	2	A
Bg	Blyburg-----------	I	Silty-------------	1	F
Bk	Blyburg-----------	I	Silty-------------	1	F
	Gayville----------	VIs	Saline Lowland-----	9W	J
Bm	Bon---------------	I	Loamy Overflow-----	1	K
Bn	Bon---------------	VIw	Loamy Overflow-----	1	NS
Ca	Chancellor--------	IIw	Loamy Overflow-----	2	A
	Tetonka-----------	IVw	Wet Meadow---------	10	B2
Cc	Chaska------------	VIw	Subirrigated-------	1K	NS
Cd	Clamo-------------	IIIw	Clayey Overflow----	10	B1
DaA	Dalesburg---------	IIs	Loamy Overflow-----	1	K
DbB	Dalesburg---------	IIe	Loamy Overflow-----	1	K
	Dimo--------------	IIw	Loamy Overflow-----	1	K
DcA	Davis-------------	I	Loamy Overflow-----	1	K
DcB	Davis-------------	IIe	Silty-------------	3	F
DhA	Davison-----------	IIs	Limy Subirrigated--	1K	F
	Chancellor--------	IIw	Loamy Overflow-----	2	A
DkA	Davison-----------	IIs	Limy Subirrigated--	1K	F
	Tetonka-----------	IVw	Wet Meadow---------	10	B2
	Egan--------------	I	Silty-------------	3	F
DmB	Delmont-----------	IIIe	Shallow to Gravel--	6G	D2
	Enet--------------	IIe	Silty-------------	6G	D1
DnD	Delmont-----------	IVe	Shallow to Gravel--	6G	D2
	Talmo-------------	VIe	Very Shallow-------	10	NS
Do	Dimo--------------	IIw	Loamy Overflow-----	1	K

Interpretive Groups--Continued

Map symbol	Soil name	Land capability classification	Range site	Windbreak suitability group	Pasture suitability group
EaA	Egan	I	Silty	3	F
	Chancellor	IIw	Loamy Overflow	2	A
	Davison	IIs	Limy Subirrigated	1K	F
EbA	Egan	I	Silty	3	F
	Clarno	I	Silty	3	F
	Chancellor	IIw	Loamy Overflow	2	A
EcA	Egan	I	Silty	3	F
	Clarno	I	Silty	3	F
	Tetonka	IVw	Wet Meadow	10	B2
EdA	Egan	I	Silty	3	F
	Clarno	I	Silty	3	F
	Trent	I	Loamy Overflow	1	K
EdB	Egan	IIe	Silty	3	F
	Clarno	IIe	Silty	3	F
	Trent	I	Loamy Overflow	1	K
EeB	Egan	IIe	Silty	3	F
	Ethan	IIIe	Thin Upland	8	G
EfB	Egan	IIe	Silty	3	F
	Ethan	IIIe	Thin Upland	8	G
	Tetonka	IVw	Wet Meadow	10	B2
EgB	Egan	IIe	Silty	3	F
	Ethan	IIIe	Thin Upland	8	G
	Trent	I	Loamy Overflow	1	K
EhA	Egan	I	Silty	3	F
	Trent	I	Loamy Overflow	1	K
EhB	Egan	IIe	Silty	3	F
	Trent	I	Loamy Overflow	1	K
Ek	Egan	I	Silty	3	F
	Trent	I	Loamy Overflow	1	K
	Chancellor	IIw	Loamy Overflow	2	A
Em	Enet	IIs	Loamy Overflow	1	K

Interpretive Groups--Continued

Map symbol	Soil name	Land capability classification	Range site	Windbreak suitability group	Pasture suitability group
EnB	Enet	IIe	Silty	6G	D1
	Storla	IIIs	Limy Subirrigated	1K	F
	Tetonka	IVw	Wet Meadow	10	B2
EoD	Ethan	VIe	Thin Upland	8	G
	Betts	VIe	Thin Upland	8	G
EoE	Ethan	VIIe	Thin Upland	10	NS
	Betts	VIIe	Thin Upland	10	NS
EpD	Ethan	VIe	Thin Upland	8	G
	Bon	VIw	Loamy Overflow	1	NS
EpE	Ethan	VIIe	Thin Upland	10	NS
	Bon	VIw	Loamy Overflow	1	NS
ErC	Ethan	IVe	Thin Upland	8	G
	Clarno	IIIe	Silty	3	F
ErD	Ethan	VIe	Thin Upland	8	G
	Clarno	IVe	Silty	3	F
EsB	Ethan	IIIe	Thin Upland	8	G
	Clarno	IIe	Silty	3	F
	Bon	I	Loamy Overflow	1	K
EtC	Ethan	IVe	Thin Upland	8	G
	Clarno	IIIe	Silty	3	F
	Bon	VIw	Loamy Overflow	1	NS
EuB	Ethan	IIIe	Thin Upland	8	G
	Davison	IIe	Limy Subirrigated	1K	F
	Tetonka	IVw	Wet Meadow	10	B2
EvC	Ethan	IVe	Thin Upland	8	G
	Egan	IIIe	Silty	3	F
EzE	Ethan	VIIe	Thin Upland	10	NS
	Talmo	VIIIe	Very Shallow	10	NS
Fo	Forney	IIw	Clayey Overflow	2	A
Ga	Grable	IIs	Silty	1K	D1

Interpretive Groups--Continued

Map symbol	Soil name	Land capability classification	Range site	Windbreak suitability group	Pasture suitability group
Gt	Grable------------	IIs	Silty--------------	1K	D1
	Ticonic-----------	IIIs	Sandy--------------	5	H
	Vore--------------	IIs	Clayey Overflow----	1K	I
Gv	Grable------------	IIs	Silty--------------	1K	D1
	Vore--------------	IIs	Clayey Overflow----	1K	I
	Haynie------------	I	Silty--------------	1K	F
Ha	Haynie------------	I	Silty--------------	1K	F
Hg	Haynie------------	I	Silty--------------	1K	F
	Grable------------	IIs	Silty--------------	1K	D1
Hn	Haynie------------	I	Silty--------------	1K	F
	Lossing-----------	I	Clayey Overflow----	1K	I
	Grable------------	IIs	Silty--------------	1K	D1
Ho	Haynie------------	I	Silty--------------	1K	F
	Onawa-------------	IIs	Clayey Overflow----	1K	I
	Blake-------------	I	Silty--------------	1K	F
Ja	James-------------	VIs	Saline Lowland-----	10	J
La	Lakeport----------	I	Clayey Overflow----	1	A
Lb	Lamo--------------	IIw	Subirrigated-------	2K	A
Lc	Lamo--------------	IIIw	Subirrigated-------	2K	A
Ld	Lamo--------------	IIw	Subirrigated-------	2K	A
	Baltic------------	IIIw	Clayey Overflow----	2K	A
Le	Lex---------------	IIIw	Subirrigated-------	2K	A
Lg	Lossing-----------	I	Clayey Overflow----	1K	I
Lo	Lossing-----------	I	Clayey Overflow----	1K	I
	Owego-------------	IIw	Clayey Overflow----	1	A
Lr	Lossing-----------	I	Clayey Overflow----	1K	I
	Vore--------------	IIs	Clayey Overflow----	1K	I
Lt, Lu	Luton-------------	IVw	Clayey Overflow----	2	B1
McA	Meckling----------	IVs	Subirrigated-------	1K	H
Mo	Modale------------	I	Silty--------------	1K	F
Na	Napa--------------	VIs	Saline Lowland-----	10	NS
	Luton-------------	IVw	Clayey Overflow----	2	B1

Interpretive Groups--Continued

Map symbol	Soil name	Land capability classification	Range site	Windbreak suitability group	Pasture suitability group
Nb	Norway------------	VIIIw	---	10	NS
NcA	Norway------------	VIw	---	10	NS
	Meckling----------	IVs	Subirrigated-------	1K	H
Oa	Onawa-------------	IIs	Clayey Overflow----	1K	I
Ob	Onawa-------------	IIs	Clayey Overflow----	1K	I
	Owego-------------	IIw	Clayey Overflow----	1	A
Oc, Og	Orthents----------	VIIIs	---	10	NS
Om	Orthents----------	VIe	Thin Upland--------	8	G
Os	Orthents----------	VIIIs	---	10	NS
Ow	Owego-------------	IIw	Clayey Overflow----	1	A
Pe	Percival----------	IIs	Clayey Overflow----	1K	I
Ro	Roxbury-----------	VIw	Loamy Overflow-----	1K	NS
Sa	Salix-------------	I	Silty--------------	3	F
Sd	Salmo-------------	VIs	Saline Lowland-----	10	J
SeB	Sardak------------	VIe	Sands--------------	7	NS
SkB	Sardak------------	VIe	Sands--------------	7	NS
	Scroll------------	IIIs	Clayey Overflow----	6G	I
SpA	Scroll------------	IIIs	Clayey Overflow----	6G	I
	Percival----------	IIs	Clayey Overflow----	1K	I
SpB	Scroll------------	IVe	Clayey Overflow----	6G	I
	Percival----------	IIIe	Clayey Overflow----	1K	I
TaE	Talmo-------------	VIIe	Very Shallow-------	10	NS
	Thurman-----------	VIe	Sandy--------------	10	NS
Te	Tetonka-----------	IVw	Wet Meadow---------	10	B2
ThA	Thurman-----------	IVs	Sandy--------------	5	H
ThB	Thurman-----------	IVe	Sandy--------------	5	H
ThC	Thurman-----------	VIe	Sandy--------------	7	H
Tr	Ticonic-----------	IIIs	Sandy--------------	5	H
	Grable------------	IIs	Silty--------------	1K	D1
TtA	Trent-------------	I	Loamy Overflow-----	1	K
	Tetonka-----------	IVw	Wet Meadow---------	10	B2
	Wakonda-----------	IIs	Limy Subirrigated--	1K	F

Interpretive Groups--Continued

Map symbol	Soil name	Land capability classification	Range site	Windbreak suitability group	Pasture suitability group
TwA	Trent-------------	I	Loamy Overflow-----	1	K
	Wentworth---------	I	Silty--------------	3	F
Wa	Wakonda-----------	IIs	Limy Subirrigated--	1K	F
	Tetonka-----------	IVw	Wet Meadow---------	10	B2
Wc	Wakonda-----------	IIs	Limy Subirrigated--	1K	F
	Wentworth---------	I	Silty--------------	3	F
	Whitewood---------	IIw	Loamy Overflow-----	2	A
Wd	Wakonda-----------	IIs	Limy Subirrigated--	1K	F
	Whitewood---------	IIw	Loamy Overflow-----	2	A
WkB	Wentworth---------	IIe	Silty--------------	3	F
	Trent-------------	I	Loamy Overflow-----	1	K
Wm	Whitewood---------	IIw	Loamy Overflow-----	2	A
Wo	Worthing----------	Vw	Shallow Marsh------	10	B2
Wp	Worthing----------	VIIIw	---	10	NS